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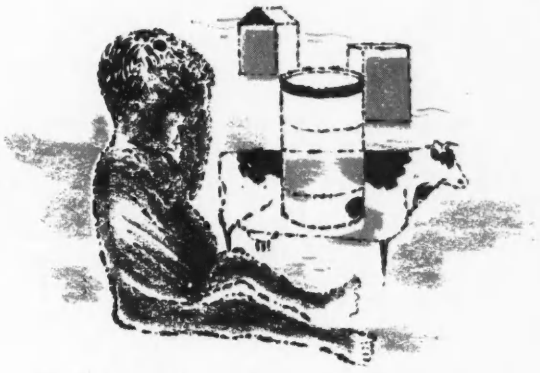

Kwashiorkor seen in children during the post-weaning period responds to treatment with dairy products, particularly nonfat dry milk

Cheilosis, facial lesions, and "Casal's necklace"—classic symptoms of pellagra—are all evident in this Egyptian.

Nutritional Deficiency Diseases Today[1]

A DECADE AGO nutritionists in the United States and other economically well developed countries may well have thought that the era of dietary deficiency diseases had passed. Such a notion led many to feel that nutritionists' responsibility in the future would concern matters of food policy during periods of emergency or disaster feeding; the usually benign, and not always effective, "education of the public"; and, of course, an essential role in planning for the feeding of the sick. We were lulled into a sense of false security by the virtual absence in our own country of endemic deficiency diseases and by our relative isolation from and ignorance of conditions in many other parts of the world, except through contact with and concern for conditions of starvation and the grim results of food scarcities in war-torn areas and prison camps. How wrong such a thought was is readily evident by the developments since that time.

Three forces were instrumental in our awakening: (a) the sudden recognition of new deficiency syndromes, (b) the realization that certain metabolic diseases are influenced by dietary factors previously considered to be of little importance, and (c) the spotlighting of nutritional deficiency diseases throughout the world as a result of the activities of the international agencies, particularly the World Health Organization and the Food and Agriculture Organization of the United Nations (WHO and FAO).

New Deficiency Diseases

As an example of the first of these points, may I succinctly note the developments relative to vitamin B_6 in human nutrition (1). A syndrome of pyridoxine deficiency was produced experimentally by Vilter (2) in adult human subjects through the combination of a vitamin B_6-low diet and administered desoxypyridoxine; in infants, Holt and co-workers (3) produced a syndrome of convulsions and other findings by feeding a pyridoxine-deficient diet; McGanity and associates (4) had previously demonstrated a biochemical effect of pyridoxine in man and other biochemical effects (5, 6) were reported by several investigators; the widespread occurrence of convulsions in infants fed on a particular infant food was

[1] Presented at the 39th Annual Meeting of The American Dietetic Association in Milwaukee, on October 10, 1956.

recognized as amenable to pyridoxine therapeutically (7); Biehl and Vilter (8) showed that isoniazide (INH) therapy sometimes produces peripheral neuritis and an enhanced urinary loss of vitamin B_6, but that pyridoxine dosage prevents or cures the symptoms. Similarly, Reilly and co-workers (9) found that INH-induced convulsions responded to pyridoxine. Such observations have led to recognition of the necessity for vitamin B_6 in the diet of man and the occurrence of conditioned deficiencies as a result of various influences.

Here then lies a whole new field concerning which our knowledge is yet but fragmentary. Indeed, it is startling to find that no tables of food composition include values for vitamin B_6 and that we have so little knowledge of the vitamin B_6 content of foods that we cannot adequately calculate the pyridoxine content of ordinary diets!

At long last, critically accumulated convincing information concerning tocopherol in human nutrition is accruing. The work of Gordon and of György has shown demonstrable biochemical and physiologic effects of tocopherol in certain infants (10–12), especially prematures and infants with steatorrhea. Woodruff (13) has demonstrated that biochemical changes resulted from conditioned tocopherol deficiency in an adult, a subject with steatorrhea. The studies currently underway at Elgin State Hospital (14) promise to give an estimate of the body stores of tocopherol and of the level of tocopherol nutriture which may be associated with biochemical or metabolically detectable findings.

These are but two examples of advances in our understanding of newer vitamins. When we think of the number of growth factors and nutrients poorly understood in man, we can grasp something of the task which lies ahead in clinical nutrition.

Nutrition and Metabolic Diseases

What of the role of nutrition and diet in certain of the metabolic diseases? I need not dwell on cardiovascular disease because many speakers on your program will deal with this topic. Perhaps, however, it would be permissible to mention the recent exciting demonstration by Bronte-Stewart and his co-workers (15) that ingestion of a lipid fraction of unsaturated fats containing the so-called essential fatty acids is effective in reducing the serum cholesterol level in human beings. This observation, taken together with the findings of Rinehart (16), of pathologic changes in the vessels of pyridoxine-deficient monkeys, suggests that we are on the threshold of new discovery of the importance of essential nutrients in human disease.

Protein Malnutrition of Kwashiorkor

Let us now turn to those diseases of which we have been made acutely aware by work of the international agencies FAO/WHO (17), and first to protein malnutrition or kwashiorkor. Although recognized by many workers for nearly a half a century, it was not until the FAO/WHO sponsored the Brock-Autret report (18) that this disease was highlighted. Kwashiorkor is now recognized as occurring widely (19–22) in Africa, Asia, Central America, South America—indeed, wherever children are fed on high-carbohydrate, low-protein diets during the early years of life. That this disease is in fact primarily the result of lack of protein in the diet is supported by the findings of Brock and co-workers (23, 24), that administration of a mixture of amino acids without supplementary vitamins or other nutrients is followed by an "initiation of cure."

Of especial importance is the concept of pre-kwashiorkor (21, 22) which has arisen in recent years, a concept supported especially by the work of Scrimshaw and his group at the Institute of Nutrition for Central America and Panama (INCAP). It has been found (21) that a high percentage of Central American children exhibit a marked retardation in growth and bone maturation in proportion to age. The average retardation is one to two years during the period from a short time post-weaning until after the child reaches school age. These children show hair and skin changes which are recognizable, but not those characteristic of acute kwashiorkor. The child usually exhibits excessive docility, even to a point of apathy, and certain biochemical changes indicating sub-normal nutriture. Despite the absence of kwashiorkor among these children, it is clear that they suffer from protein malnutrition.

Programs to Combat Protein Malnutrition

What efforts are being undertaken to combat this problem of protein malnutrition? All of you, of course, are aware of the UNICEF (United Nations International Children's Fund) milk distribution program, one obvious step toward control of this disease. Unfortunately, this program cannot hope to reach all of the infants suffering from protein malnutrition or all in whom the disease should be prevented. Milk supplies and personnel are insufficient. Such a program also involves a Herculean task of education for acceptance and use of the product in many quarters. UNICEF is, of course, making every effort to increase the amount of milk available in protein-deficient areas through its encouragement of milk production and improvement of milk processing within the countries. Again, this is but one of the needed steps.

FAO, with its interest and responsibility in agriculture and food production, is encouraging increased protein production for human consumption. On the other hand, as one knows, the identification of good quality, locally available, cheap proteins suitable for infant feeding is not a simple matter. To assist

with the identification of proteins suitable for infant feeding, the World Health Organization has appointed a Protein Advisory Group which works in close liaison with the staffs of WHO, FAO, and UNICEF, and is giving special attention to the question of suitability for human use of such proteins as oil seed presscakes, fish meal, and soya products. To assist with this work, the Food and Nutrition Board of the National Research Council has organized a Committee on Protein Malnutrition. To this Committee has been made available by The Rockefeller Foundation a sum of $250,000 to support studies on proteins for infant feeding in protein-deficient areas. It is hoped that from the guidance of these combined groups and the work of the many centers throughout the world engaged in studying this problem, effective means of dealing with protein malnutrition will be developed in region after region until the disease is brought under control.

Pellagra

A closely related problem is that of pellagra, which is endemic in several countries (17), particularly Yugoslavia, Egypt, Basutoland, and Southern Rhodesia, and which has been reported from the majority of countries in Latin America since 1940, from Puerto Rico, Portugal, India, and, during the Spanish Civil War (1936–39) from Spain. This disease exists in close association with a high consumption of maize. When the maize is diluted by other foods, especially those with proteins richer in tryptophan and higher in niacin, the disease decreases or disappears. Thus, in Egypt, Vilter and I, from epidemiologic studies, concluded that pellagra ceased to be a major problem when wheat, millet, or rice replaced a considerable fraction of the maize. Policy-wise, such findings indicate that the internal redistribution of cereals within a country would effect a diet based on a mixture of cereals rather than maize alone and thus should aid in preventing the disease.

Dermatitis with symmetrical lesions of the exposed areas of the extremities is characteristic of pellagra.

In a region in Yugoslavia (25) in which at the height of the pellagra season the disease is present in 8 to 30 per cent of the population, we have demonstrated the feasibility of vitamin enrichment of the maize and the effectiveness of such enrichment in the control of pellagra. It is clear, then, that both of these procedures can be recommended as pellagra-control measures. Obviously, they require education and agricultural betterment which, if effective, further aids in the control of nutritional deficiencies. These are measures which lie within the province of FAO. Thus one may see the close relationship between the interests of these several agencies.

Endemic Goiter

Endemic goiter, or iodine lack, is another widespread nutritional deficiency toward which the international agencies, particularly WHO, have addressed a great deal of attention (17). The effective public health measure of salt iodization has been limited in its application in underdeveloped countries due to the instability of iodide in the moist crude salt used in those countries. Sea salt, which when freshly prepared contains iodine, rather rapidly loses its iodine on standing (26). Accordingly, the World Health Organization, working closely with the Chilean Iodine Educational Bureau and the Institute of Nutrition of Central America and Panama, has studied the use of a stable form (27) of iodate in crude salt (28). Iodate, on ingestion, is rapidly reduced in the stomach to iodide and subsequently metabolized as iodide (29). It has been shown by the workers at INCAP (30) to be effective in the reduction of endemic goiter of adolescence. A relatively simple, inexpensive machine for mixing iodate with salt has been designed by engineers working with the Chilean Iodine Educational Bureau (31), and such machines have now been installed in a number of countries deriving their salt from small producers. These developments have given for the first time an effective tool in the control of endemic goiter in underdeveloped areas.

Perhaps a word concerning goitrogens and their importance is in order. It is well established that in a few foods there exist natural goitrogens. In Tasmania, Clements (32) recently demonstrated that under specialized conditions, a naturally occurring goitrogen in a food may influence iodine metabolism in the human. No doubt, as our knowledge increases, unusual situations of this sort may be demonstrated elsewhere. However, the occurrence of these unusual situations should not lead us to expect them to become commonplace. The widespread effectiveness of iodine administration in the prevention of endemic goiter is so well established that there is no reason to question its usefulness as a public health preventive measure.

Other Nutritional Deficiencies

I can but mention three other important nutritional deficiency conditions which the recent activities of the World Health Organization (17) have brought forcibly to our attention: avitaminosis A, nutritional anemias, and the interrelationship between parasitism and nutrition. WHO is activating plans for study of these nutritional diseases. We can expect an enhanced understanding of their etiology and control to result from such investigations.

Problems of Nutrition Education

Finally, I should like to touch briefly on a major problem in the control of nutritional disease and on an area in which our knowledge is probably most limited, that is, the methods and content of nutrition education (17). Food in every culture has a basic significance. In the non-scientific cultures, the arguments sometimes effective in our society are futile. Without an understanding of the meaning of food to people, of its symbolism, and of the views toward particular foods, one cannot plan sound educational approaches. Change in cultural patterns (30) occur only when the people are convinced that proposed changes further the attainment of some goal strongly desired by the community or individual. In other words, education is accepted only when there is an understandable motivation on the part of the individual to be educated. The educator must appreciate this and plan his educational approach accordingly. To have such appreciation demands knowledge which is usually assigned to the subject area of cultural anthropology. Effective education in nutrition is limited most sorely today by our lack of this information. Again, in recognition of this, the World Health Organization has taken pioneering steps by sending cultural anthropologists into the field to assist in learning and understanding the role of food in particular societies, the attitude towards foods, and toward change in food habits.

Thus it may be said that, as a result of new scientific information and of the conscious effort to discover nutritional diseases in the world, it is evident that the problem of nutritional deficiency diseases is one of much broader significance and greater complexity than was widely appreciated a few years ago, and it seems unlikely that simplification will occur.

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Encouraging Zulus to Eat Eggs

At the Polela native reserve in the Union of South Africa, where some 16,000 Zulus live, a Health Centre was founded in 1940. Some of the activities of this Health Centre were reported by Dr. John Cassell, School of Public Health, The University of North Carolina, at the American Public Health Association Meeting in Atlantic City in November.

Problems were broadly classified into those needs that were "felt" and "unfelt." The "unfelt" needs included, among others, the totally inadequate diet. Through home visits and small group discussions, the health educators tried to make the "unfelt" needs of the community "felt," and to motivate people to make those changes in their way of life that were necessary to meet these needs.

Eighty per cent of the people exhibited marked stigmata of malnutrition, and evidence of gross nutritional failure in the form of pellagra and kwashiorkor was common. Dietary surveys revealed that the diet consisted principally of a single staple, corn, prepared in numerous ways, supplemented by dried beans, negligible amounts of milk, and occasionally meat and wild greens. Potatoes and pumpkins were eaten seasonally, and millet (sorghum) was fermented to brew beer which was consumed in large quantities. Whenever funds allowed, sugar and white bread were bought. About half the families produced less than one-fourth the corn needed to feed themselves, and consequently a large percentage of their food consisted of refined corn meal which was purchased. Furthermore, during the best month of the year, if all milk had been equally distributed, only one-twentieth pint per head per day would be available.

In addition to extreme poverty and extensive soil erosion, factors responsible for the poor diet included certain traditions as to which foods were customary, ignorance of the nutritional values of food, and inefficient use of available sources. Also, commonly used cooking methods frequently destroyed a large fraction of what nutrients were present.

It appeared that green vegetables, eggs, and milk were the foods on which greatest emphasis should be laid. Attempts to increase egg consumption encountered some resistance. Surveys revealed that over 95 per cent of the families had poultry, and that eggs were relatively plentiful at certain seasons of the years. However, they were infrequently eaten, and very definite views were held by the community about them. It was considered uneconomical to eat an egg that would later hatch and become a chicken; egg-eating was regarded as a sign of greed; and finally eggs were thought by some people to make girls licentious.

After prolonged staff meetings, the consensus was that none of these beliefs had any deep emotional associations and that probably the concept of it being poor economy to eat eggs was the most important factor preventing their further use. The program as developed, based on this analysis, involved techniques for improving the egg yield, whereby eggs could be eaten and enough would be left for breeding; the nutritional value and palatability of eggs were stressed both in the community education programs and for each specific patient at the prenatal and mother-and-baby sessions; and various methods of incorporating eggs into the diet without any marked modification of prevailing recipes were demonstrated. The fact that certain adverse views were held about eggs was of importance, however, for they indicated that considerable effort would be required to motivate the community to use eggs.

The response to this program was relatively slow. However, in the course of twelve years, consumption of eggs, particularly in infant diets, steadily increased. Furthermore, toward the later years of the program, families began to put excess eggs on the local market and found purchasers among their neighbors, a phenomenon totally foreign to this community.

Analogous programs to increase the use of vegetables and of milk were also carried out in the community, although they presented different problems.

Lipemia in Patients with Coronary Heart Disease[1]

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COMPARATIVE studies of the dietary habits of different population groups and of the same peoples during and after World War II have indicated that variations in the incidences of coronary heart disease and other atherosclerotic lesions are closely related to the amount of fat consumed (1–6). Consumption of a diet with a high proportion of calories supplied by fats is associated with a high incidence of coronary heart disease, and low-fat consumption is associated with a low incidence of the disease. These studies suggest the possibility that a high daily fat intake may well be responsible for a sustained high blood lipid level in the older age group, which in turn may lead to the gradual development of coronary heart disease. The present discussion, however, will be limited to: (a) the more immediate effect of postprandial lipemia on the myocardial oxygenation in patients who are known to have clinical coronary heart disease with an impaired myocardial circulation, (b) the rationale of using heparin and the kind of low-fat diet which can adequately prevent the development of lipemia during the postprandial period, and (c) the type of clinical response obtained with these patients by using this therapeutic regimen.

Laboratory Experimentation

It has been demonstrated that the local tissue oxygen tension, i. e., oxygen availability, can best be determined by means of the polarographic method. Sayen and his associates (7) have employed it to study the myocardial circulation in dogs during experimental coronary occlusion and pure oxygen breathing.

In the laboratory, myocardial infarction was produced on a small series of dogs by the ligation of a small branch of the left anterior descending coronary artery. Direct recording of the oxygen tensions by the polarographic method was made on the exposed dogs' myocardium. A sharp drop in the oxygen tension readings from the control levels was observed within 2 min. following a slow intravenous injection of 20 ml. of a 10 per cent sesame oil and 5 per cent dextrose emulsion. At this time, cinematic records showed a progressive dilatation of the heart and a decrease in the amplitude of myocardial contraction during ventricular systole. Control studies made on the same animals with intravenous saline or dextrose injections failed to produce the same phenomenon. In these investigations, as yet unpublished, however, we were unable to demonstrate this in a series of animals with an intact coronary circulation.

Angina Pectoris Induced by a Fatty Meal

These laboratory observations suggested that postprandial lipemia might exert a similar adverse effect on the myocardial circulation in patients with severe coronary heart disease. Lipemia was, therefore, induced in a group of fourteen selected patients with coronary heart disease and angina pectoris by a fatty meal consisting of heavy cream (40 per cent butter fat by weight) flavored with cocoa and Sucaryl (8). In this test, each patient received 0.6 gm. butter fat per pound of body weight. For control studies, a nonfat meal of Protenum, dextro-maltose, and sugar was used. The degree of lipemia attained by each of these patients for a period of 6 hr. postprandially was determined and expressed in lactescence or turbidity units by means of a photoelectric colorimeter. Electrocardiograms and ballistocardiograms were taken during the control period, at various intervals after fat feeding, and in some patients both during and after the attack of anginal pain.

A total of fourteen typical attacks of angina pectoris were observed in six of these fourteen patients,

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3 to 5 hr. after the fat ingestion, when the post-absorptive lipemias were at or near their peak values. Electrocardiograms and ballistocardiograms taken during the anginal attack in each of these patients supported the belief that they experienced acute myocardial ischemia. No anginal pain was elicited in these same patients after they were given the nonfat test meal, and the plasma lactescence studies failed to demonstrate any significant degree of lipemia for periods up to 5 hr. after the meal.

Fat Tolerance Test in Cardiac Patients

Serum triglyceride (neutral fat) levels during the fasting state and at various intervals after the administration of a standardized fatty meal on a group of fifteen patients with coronary heart disease were studied and compared with that of a group of normal young subjects (9). All of the atherosclerotic subjects showed a higher and more sustained post-absorptive lipemia than that of the normal young subjects. In the majority of patients with coronary heart disease, the postprandial lipemia reached its peak as late of 5 hr. after fat ingestion, and a complete clearing of the plasma of the chylomicrons was not observed until several hours afterwards. These findings are in agreement with the results obtained by a number of other investigators who followed the fat absorption curve of atherosclerotic patients (10–12). In the light of our recent observations, it is felt that prolonged postprandial lipemia might well further impair temporarily the already precarious myocardial circulation and exaggerate the pre-existing myocardial insufficiency in patients with coronary heart disease.

Effect of Heparin on Angina Pectoris and Blood Lipids

In a recent study (13), we found that intravenous injection of 5 to 25 mg. heparin quickly relieved the patients of the lipemia-induced anginal pain on fourteen occasions in a group of seven selected patients with severe coronary heart disease. The subjective symptoms of pain and tightness in the chest began to improve within 2 to 3 min. after the heparin injection, although it took about 10 min. for the electrocardiographic and ballistocardiographic changes to return to their original control levels. Intravenous injection of physiologic saline failed to terminate the anginal attack in 5 to 10 min.

Blood lipid studies showed that 5 to 5½ hr. after fat ingestion, both the plasma turbidity readings and the serum triglyceride content rose sharply from the fasting levels indicating that high degrees of postprandial lipemia were present. Heparin given intravenously at the height of the post-absorptive lipemia promptly resulted in a precipitous lowering of both the plasma turbidity and the serum triglyceride concentration.

Low-Fat Diet for Angina Pectoris and Coronary Heart Disease

Since it has been demonstrated that prolonged lipemia may temporarily aggravate myocardial insufficiency in patients with coronary heart disease, it is reasonable to expect that the signs and symptoms of myocardial anoxia would improve after the successful control of the lipemic state. In our opinion, the control of lipemia can best be achieved by the use of an extremely low-fat diet. Twelve patients with severe coronary heart disease or peripheral vascular disease or both were put on a diet consisting of 15 to 20 gm. fat per day for fourteen to thirty months. Ten of the twelve patients have been able to cooperate with us in full. The blood lipid levels of these ten patients started to fall soon after the dietary limitation was begun and reached a minimum which was close to the average normal level in eight to ten weeks. As the lipemia cleared, subjectively, the patients experienced a sense of well-being, increase of exercise tolerance, a greater freedom from angina pectoris and/or intermittent claudication. Objective findings included improvement in the resting ballistocardiogram, change from a previously positive electrocardiographic exercise test to a negative one, and an increase in the standardized "claudication time."

The two remaining patients who had made only sporadic efforts to follow the prescribed diet served as our controls. No subjective or objective evidence of improvement in their clinical conditions has been noted. In one, the anginal attacks seemed to become worse during the period of observation.

More recently, we noticed that a number of patients with acute myocardial infarction may experience attacks of anginal pain unrelated to physical exertion during their convalescence. Some of these attacks seemed to have been precipitated by postprandial lipemia and thus could be averted by a low-fat diet. On the average, seven to ten days of severe dietary fat restriction were required to control their lipemia and to improve their anginal attacks.

It is of some importance to mention that, except for the complaint made by two of our patients of some dryness of the skin, we have not observed any serious deficiency syndrome which could be ascribed to the prolonged and severe dietary restriction of fat. The dryness of the skin lasted only for a short time in both of the patients while they were continued on the dietary regimen.

Discussion

These studies indicate that: a hyperlipemic state is frequently encountered in patients with coronary heart disease; it is exaggerated by the ingestion of a high-fat diet; and the hyperlipemia may actually exert a deleterious effect on the myocardial circulation which has previously been disturbed by coronary atherosclerosis. The exact mechanism by which

these large lipid particles in the blood stream may influence the myocardial oxygenation in patients with coronary heart disease is not entirely clear at present. To date, a number of changes in the blood following the ingestion of meals high in fat content have been reported by various investigators. These changes include: an increase in the coagulability of the blood secondary to certain physical changes in the platelets (14), sludging of the circulating red blood cells (15), an increase in the viscosity and in the adhesiveness and aggregation (16) of the blood and red cells. Preliminary data obtained from our own study strongly suggest that the layering of the large lipid particles along the wall of the capillaries may play an important role, in addition to these other mentioned factors in impeding the oxygenation of the infarcted myocardium.

Although *in vivo* heparin acts as a strong lipolytic agent and would generally produce a rapid clearing of the circulating plasma of the large triglyceride particles in most instances, its antilipemic activity, however, is relatively transient and incomplete in a number of patients who have a tendency to hyperlipemia and poor fat tolerance. In our experience, heparin in dosages up to 200 mg. per day given in divided doses is generally insufficient to control postabsorptive lipemia in a patient who is being maintained on a full diet. The necessity of administering heparin by the parenteral route, together with its potent anticoagulant action, further limit the usefulness of the drug given for the purpose of combating hyperlipemia. Therefore, we must depend mainly on the use of a low-fat diet in treating these patients.

The theory that the use of a low-fat diet may affect the development of coronary heart disease is not new. It must be emphasized, however, that by prescribing a low-fat diet here, we are aiming at the lowering of the pre-existing lipemia towards normal level and at eliminating the postabsorptive lipemia which has been shown to be harmful to patients with coronary heart disease. Whether the prolonged use of a low-fat diet is actually capable of causing a regression of human coronary atherosclerosis is beyond the scope of this discussion. Experiences gained from our studies show that, in order to achieve the above mentioned aims, an extremely restricted diet containing 15 to 20 gm. fat per day should be prescribed. In addition, the total daily fat allowance should be distributed as evenly as possible among all the meals of the day to avoid undesirable lipemic peaks.

A number of investigators believe that a severe restriction of food fat is an unsound and impractical procedure (17, 18) because it is unpalatable and because, with it, proper nutrition is difficult to maintain. From the standpoint of nutrition, it is of interest to note that up to the present, no evidence of a nutritional deficiency of major importance has been observed in any of our patients who have been subsisting on an extremely low-fat intake for a prolonged period of time. Some of these patients have been followed by my colleagues and myself for six to eight years. To serve attractive, good tasting, and wholesome meals to patients on a low-fat diet is a challenge to a good dietitian. A number of dietary manuals on low-fat diets have already appeared (19, 20). They contain many excellent menus and recipes with suggestions on the choice and preparation of foods with low-fat content to make good, enjoyable meals for the patient and his family.

Summary

Postprandial lipemia may precipitate angina pectoris in patients with severe coronary heart disease. Experimental work suggests that the high neutral fat content in the plasma acts in some manner to diminish the local oxygen availability in the myocardium, which has previously been infarcted by experimental coronary occlusion.

Intravenous injection of a small dose of heparin promptly clears the blood of the postabsorptive chylomicrons in these patients, and at the same time quickly relieves the lipemia-induced angina pectoris.

A patient who uses and remains on a low-fat diet which does not cause a significant postprandial rise in the neutral fat content of the blood often experiences a progressive improvement of his symptoms and signs of coronary insufficiency.

A diet which is very restrictive in fats can be made palatable and even enjoyable by skillful dietary management. Except for some dryness of the skin, lasting only for a short time, no deficiency syndrome has been observed in patients subsisting on an extremely low-fat diet for six to eight years.

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BIOGRAPHICAL NOTES FROM THE HISTORY OF NUTRITION

Sir Jack Cecil Drummond—January 12, 1891–August 5, 1952

Able men leave their mark in the field of their specialization, and Jack Drummond has left his mark in nutrition in several ways. It was his proposal (1920) that the word "vitamine," which originated with Funk in 1912, be changed to "vitamin," since the former term was misleading as regards the chemical nature of these substances; but this is possibly already forgotten. While the work for the maintenance of the nutritional health of the people of England during the war years will not be forgotten, probably few will remember that Drummond's was the guiding hand in food policy in those troublous times. But his classic work, *The Englishman's Food—A History of Five Centuries of English Diet*, will live on because the printed word so often survives when much else is lost. This book excellently demonstrates his breadth of knowledge in literature and history, his quiet but keen sense of humor, and his deep understanding of the problems of nutrition. The book is a collector's item in its own right (if a book can be said to have any rights), since it is now out of print, the plates having been destroyed during World War II.

Jack Cecil Drummond was well known in this country, being a visitor here in 1933 when he was Harvey Lecturer in New York and gave the Lane Lectures at Stanford University. Again, during the war years, he was here to confer with food advisers to the U. S. government. He was a man possessed of boyish vigor, youthful looks, and a breezy, friendly manner. Born January 12, 1891, his college education was at King's College, University of London, where he studied chemistry and became interested in the then comparatively new subject of biochemistry. He started his career in research as Assistant in Biochemistry at King's College, London, in 1913; was Research Assistant (1914), then Director of Biochemical Research, Cancer Hospital, London (1918). His work in vitamin research led to his appointment as the first Professor of Biochemistry at University College, London (1922–45). Under his leadership, a strong school of biochemistry developed with students from many countries coming to study under him. Drummond showed that deprivation of vitamin B_1 was associated with loss of appetite; he made extensive studies on the distribution of vitamin B_1 in the products from milling of wheat; and on tissue oxidation and B_1 . He also did much of the early work on the vitamin A and D activity of various foods and oils.

At the outbreak of World War II he became Scientific Advisor to the Ministry of Food (1939–46) and at the end of the war, he was adviser on nutrition for the Allied Post War Requirements Bureau and SHAEF (1944–45). In 1944, he was knighted and also elected a Fellow of the Royal Society. He received honors from foreign governments and several honorary degrees.

Jack Drummond was known for his friendliness, tolerance, and humility; he had an insatiable desire for knowledge and for truth and an unusual ability in expressing technical material in a way that could be understood by the layman. In 1940, he married Ann Wilbraham. While on a camping holiday in the South of France with his wife and eleven-year-old daughter, the whole family were brutally murdered on August 5, 1952.

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Supplementary Food Composition Table[1]

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Cholesterol, saturated and unsaturated fatty acids, essential fatty acids, animal and vegetable protein and fat in 81 fat-containing foods

AS A PRELIMINARY to inaugurating programs for improved nutrition, the immediate practical value of a dietary study is well established. Some knowledge of what people eat is also extremely valuable in basic research. Recently, there has been much discussion regarding the role which diet may play in the increasing mortality from degenerative heart disease in this country. It is important, therefore, that adequate knowledge of the present-day American diet, as it is consumed by different groups, be available for purposes of study and comparison. Only then can valid correlations and conclusions be made as to its role in the development of atherosclerosis.

Because atherosclerosis is a disease characterized by lipid deposits in the arterial walls, it is generally supposed that there must be a cause and effect relationship between serum lipid levels and development of the disease. The problem of determining which dietary component, if any, is responsible for the undesirable elevation of serum lipids is made more complex by the accumulation of evidence which appears to point to more than one aspect of the diet. The theory that the total amount of fat in the diet is responsible has been advanced by Keys and co-workers (1). Another view has been taken by other investigators who suggest that the amount of animal fat in the diet may be of more significance than the total amount of fat and that substitution of vegetable fat for animal fat may indeed lower the level of serum lipids (2–4). This fall in serum lipids is believed by some workers to be directly related to the degree of unsaturation of the fat, which reflects the amount of essential fatty acids present, rather than to its vegetable or animal origin *per se* (5, 6). As regards dietary cholesterol, it is generally recognized that dietary intake of cholesterol in certain animal species may affect the level of serum cholesterol, although this relationship has yet to be demonstrated in the human species. Even dietary protein has been implicated in animal studies as a factor to be considered in the development of atherosclerosis (7).

Food Composition Tables

In any study of food practices, probably the most important adjunct is a reliable food composition table. Presently, many such tables are available, although in this country the Agriculture Handbook No. 8 (8) is the basis for most of our information about the composition of foods. Various other countries have, of course, developed their own tables, and the Food and Agricultural Organization of the United Nations has published *Food Composition Tables for International Use* (9).

It is well to remember that none of these tables can provide a completely accurate analysis of food intake, since the composition of foods varies according to genetic strain, climate, processing procedures, and storage. In most instances the figures represent means of a series of analyses of the same food in different seasons and from different locations. Furthermore, discrepancies in data from different food tables regarding composition of the same foods may arise from the use of different analytical techniques. However, many workers who have investigated the question of whether data from published food composition tables differ markedly from data de-

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TABLE 1 Supplementary composition figures for some fat-containing foods (household portions)*

FOOD	SERVING		CALORIES	PROTEIN		FAT		CHOLESTEROL	CARBOHYDRATE	FATTY ACIDS		ESSENTIAL FATTY ACIDS		
	Amount	Weight		Animal	Vegetable	Animal	Vegetable			Total saturated	Total unsaturated	Linoleic	Linolenic	Arachidonic
Bread Products														
		gm.		gm.	gm.	gm.	gm.	mg.	gm.	gm.	gm.	gm.	gm.	gm.
Bread, white	1 slice	23	61	0.2	1.6	0.7	0.2	0.8	11	0.27	0.53	0.15	0.01	—
Doughnut, plain (made with hydrogenated vegetable shortening, fried in hydrogenated beef fat)	1	32	139	0.7	1.7	5.7	1.0	26.6	17	(—)	(—)	(—)	(—)	(—)
French toast														
Grilled with 1 tsp. butter	1 slice	55	153	3.4	1.6	7.9	0.2	143.7	15	3.87	3.83	0.79	0.07	0.11
Grilled with 1 tsp. margarine	1 slice	55	153	3.4	1.6	3.8	4.3	129.5	15	2.25	5.44	0.90	0.07	0.05
Griddle cake (made with hydrogenated vegetable shortening)	2 cakes	75	294	3.5	4.3	3.6	7.2	91.0	41	3.03	7.25	0.91	0.08	0.04
Waffle (made with hydrogenated vegetable shortening)	1 serving	75	246	3.7	2.9	3.7	9.4	128.3	25	3.31	9.05	1.05	0.09	0.05
Sweet roll (made with lard)	1	54	186	0.9	3.9	5.4	0.4	37.5	28	2.00	3.47	0.84	0.05	0.03
Dairy Products														
Cheese														
Cheddar	1 cu. in.	28	113	7.1	—	9.1	—	31.5	1	5.38	3.27	0.13	0.07	0.02
Cottage, skim‡	1 tbsp. rounded	28	27	5.5	—	0.1	—	0.3	1	—	—	—	—	—
Cream‡	2 Tbsp.	28	106	2.6	—	10.5	—	36.3	1	6.04	3.94	0.36	0.01	0.15
Cream														
Light, 20%‡	2 Tbsp.	30	61	0.9	—	6.0	—	20.8	1	3.45	2.25	0.21	0.01	0.09
Heavy, whipped, and sweetened‡	1 Tbsp. heaping	16	52	0.3	—	5.2	—	18.0	1	2.99	1.95	0.18	0.01	0.07
Milk														
Nonfat (skim)	1 c.	246	87	8.6	—	0.2	—	0.7	13	0.11	0.08	0.01	—	—
Whole	1 c.	244	166	8.5	—	9.5	—	32.9	12	5.24	3.79	0.55	—	0.04
Yogurt (from whole milk)	1 Tbsp.	14	13	0.9	—	0.5	—	1.7	1	0.28	0.20	0.03	—	—
Desserts														
Cake, white														
Plain (made with hydrogenated vegetable shortening)	1 piece	65	227	1.4	1.3	1.4	7.1	44.6	36	2.02	6.10	0.56	0.03	0.02
If sugar frosted, add	—	25	63	—	—	—	—	—	17	—	—	—	—	—
Cake, fudge#														
Plain (made with hydrogenated vegetable shortening)	1 piece	75	281	1.6	1.9	1.6	9.9	56.7	43	2.40	7.71	0.70	0.05	0.03
If fudge frosted, add #	—	30	93	0.5	0.1	1.9	0.4	6.6	19	1.07	0.72	0.08	—	0.02
Cookies, sugar (made with butter)	1	18	56	0.3	0.5	2.1	0.1	20.8	8	1.17	0.90	0.14	0.01	0.03
Custard, baked	½ c.	126	141	5.9	—	6.0	—	151.7	16	2.76	2.95	0.70	0.06	0.07
Ice cream, vanilla‡	½ c.	71	147	2.8	—	8.9	—	30.8	15	4.91	3.55	0.52	—	0.04
Pie, cream (filling made with butter, crust with hydrogenated vegetable shortening)	⅙ of 8-in. pie	160	330	3.8	0.7	6.9	2.5	130.9	47	3.85	5.01	0.78	0.06	0.08
Pie, fruit (filling made with butter, crust with hydrogenated vegetable shortening)	⅙ of 8-in. pie	160	402	—	1.9	3.8	14.6	13.3	60	4.95	12.33	0.84	0.03	0.05
Fats														
Butter	1 tsp.	5	36	—	—	4.1	—	14.2	—	2.36	1.54	0.14	—	0.06
Bacon, cooked	2 slices	16	97	4.0	—	8.8	—	16.0	—	2.93	5.43	0.76	0.04	0.03
Bacon, fat	1 Tbsp.	14	126	—	—	14.0	—	25.5	—	4.67	8.63	1.21	0.07	0.05
Salad dressing, cooked	1 Tbsp.	14	22	0.4	0.1	1.0	—	24.5	3	0.49	0.49	0.11	0.01	0.02
Hydrogenated vegetable shortening	1 Tbsp.	12.5	110	—	—	—	12.5	—	—	2.40	9.48	0.56	0.01	—
Margarine	1 tsp.	5	36	—	—	—	4.1	—	—	0.74	3.15	0.25	—	—
Mayonnaise (made with cottonseed oil)	1 Tbsp.	20	124	0.1	—	0.2	13.8	10.6	—	3.58	9.65	7.16	—	—
Olives, ripe	5 large or 10 small	32.5	35	—	0.5	—	3.5	—	1	0.52	2.84	0.33	—	—
Vegetable oils														
Coconut	1 Tbsp.	14	124	—	—	—	14.0	—	—	12.17	1.13	0.33	—	—
Corn	1 Tbsp.	14	124	—	—	—	14.0	—	—	1.56	11.74	5.63	—	—
Cottonseed	1 Tbsp.	14	124	—	—	—	14.0	—	—	3.59	9.71	7.25	—	—
Olive	1 Tbsp.	14	124	—	—	—	14.0	—	—	2.06	11.37	1.33	—	—
Peanut	1 Tbsp.	14	124	—	—	—	14.0	—	—	2.66	10.64	3.64	—	—
Soybean	1 Tbsp.	14	124	—	—	—	14.0	—	—	1.67	11.63	7.10	0.61	—
White sauce, medium														
Made with butter	¼ c.	66	112	2.2	0.6	8.1	0.1	28.1	7	4.62	3.15	0.36	0.01	0.09
Made with margarine	¼ c.	66	112	2.2	0.6	2.4	5.8	8.2	7	2.37	5.40	0.52	0.01	0.01

TABLE 1 (Concluded)

FOOD	SERVING		CALORIES	PROTEIN		FAT		CHOLESTEROL	CARBOHYDRATE	FATTY ACIDS		ESSENTIAL FATTY ACIDS		
	Amount	Weight		Animal	Vegetable	Animal	Vegetable			Total saturated	Total unsaturated	Linoleic	Linolenic	Arachidonic
		gm.		gm.	gm.	gm.	gm.	mg.	gm.	gm.	gm.	gm.	gm.	gm.
Fish¶														
Cod	1 serving	120	89	19.8	—	0.5	—	60.0	—	0.14	0.34	(—)	(—)	(—)
Flounder	1 serving	120	82	17.9	—	0.6	—	72.0	—	(—)	(—)	(—)	(—)	(—)
Frog	2–3 large legs	100	73	16.4	—	0.3	—	40.0	—	0.05	0.23	(—)	(—)	(—)
Haddock	1 serving	120	93	21.8	—	0.1	—	76.8	—	(—)	(—)	(—)	(—)	(—)
Halibut	1 serving	120	151	22.3	—	6.2	—	72.0	—	1.15	4.74	(—)	(—)	(—)
Lobster, canned	½ c.	50	46	9.2	—	0.7	—	104.0	—	(—)	(—)	(—)	(—)	(—)
Mackerel, Atlantic	1 serving	120	226	22.4	—	14.4	—	96.0	—	3.60	10.08	(—)	(—)	(—)
Oysters‖	1 c. (13–19 medium oysters)	240	200	23.5	—	5.0	—	784.0	13	(—)	(—)	(—)	(—)	(—)
Salmon, Pacific	1 serving	120	266	20.9	—	19.8	—	72.0	—	5.96	12.85	2.16	—	4.42
Sardines, Atlantic (drained solids)	1 piece, 3 × 1½ × 1 in.	50	107	12.9	—	5.5	—	35.0	1	1.78	3.45	0.78	—	1.15
Shrimp, canned, dry pack	4–6 shrimp	50	64	13.4	—	0.7	—	75.0	—	(—)	(—)	(—)	(—)	(—)
Tuna, canned, drained solids	½ c., scant	50	99	14.5	—	4.1	—	30.0	—	(—)	(—)	(—)	(—)	(—)
Italian Dishes														
Lasagne imbottite (made with olive oil)	1 c.	240	378	10.4	4.0	21.5	3.4	87.4	24	11.86	11.69	1.22	0.10	0.19
Meatballs, including olive oil for frying	1 meatball, 1½ in. diam.	25	94	5.2	0.2	3.4	3.8	68.9	2	1.87	5.01	0.58	0.04	0.02
Meat sauce (made with olive oil)	½ c.	105	140	5.5	1.2	3.1	7.2	28.5	5	2.27	7.42	0.71	0.02	0.01
For grated cheese topping, add	1 Tbsp.	7	28	2.6	—	1.9	—	6.6	—	1.12	0.68	0.03	0.01	—
Pizza, cheese, and tomato (made with olive oil)	1 piece, 5 × 6 in.	227	695	5.1	16.4	3.7	19.4	12.8	99	4.99	16.52	2.29	0.13	0.01
Ravioli (not including sauce)	1 c.	202	276	9.1	5.2	8.3	0.6	177.5	34	2.27	7.42	0.71	0.02	0.01
Meat and Poultry¶														
Beef round, medium fat	1 serving	120	218	23.4	—	13.2	—	150.0	—	5.22	7.32	0.20	0.06	0.03
Brains, all kinds	1 serving	90	106	8.8	—	7.3	—	2011.5**	1	(—)	(—)	(—)	(—)	(—)
Chicken fryer														
Breast (without bone)	1 serving	120	125	28.0	—	0.6	—	108.0	—	0.18	0.39	0.18	0.01	0.01
Leg (without bone)	1 serving	120	134	24.6	—	3.2	—	72.0	—	0.98	2.06	0.95	0.05	0.05
Duck, domestic	1 serving	120	391	19.2	—	34.3	—	84.0	—	(—)	(—)	(—)	(—)	(—)
Frankfurt	1 average	51	124	7.0	—	10.0	—	(—)	1	3.62	5.94	0.73	0.04	0.03
Ham	1 serving	120	413	18.2	—	37.2	—	(—)	—	11.94	23.40	2.56	0.17	0.13
Lamb, leg	1 serving	120	282	21.6	—	21.0	—	84.0	—	10.55	9.40	0.32	0.17	0.07
Liver														
Beef	1 serving	120	163	23.6	—	3.8	—	384.0	7	1.04	2.57	0.45	—	0.48
Calf	1 serving	120	169	22.8	—	5.9	—	432.0	5	(—)	(—)	(—)	(—)	(—)
Luncheon meat	1 slice	30	81	4.6	—	6.8	—	(—)	1	2.40	4.10	0.47	0.01	0.03
Pork, loin or chops (without bone)	1 serving	120	355	19.7	—	30.0	—	72.0	—	11.00	17.50	2.14	0.19	0.07
Rabbit wild	1 serving	120	149	25.7	—	4.3	—	96.0	—	1.94	2.14	(—)	(—)	(—)
Sweetbreads	½ pair	120	221	18.2	—	15.8	—	336.0	—	(—)	(—)	(—)	(—)	(—)
Tripe, beef	1 piece 5 × 2½ in.	85	84	16.2	—	1.7	—	128.0	—	(—)	(—)	(—)	(—)	(—)
Veal, leg	1 serving	120	228	22.9	—	14.4	—	168.0	—	(—)	(—)	(—)	(—)	(—)
Nuts														
Almonds	12–15 nuts	15	90	—	2.8	—	8.1	—	3	0.23	7.46	1.54	—	—
Peanuts, roasted	15–17 nuts	15	84	—	4.0	—	6.6	—	4	1.25	5.02	1.72	—	—
Pistachio nuts	30 nuts	15	88	—	2.9	—	8.0	—	3	1.09	6.51	1.56	—	—
Walnuts, English	8–15 halves	15	98	—	2.3	—	9.7	—	2	0.60	8.63	6.20	—	—
Miscellaneous Foods														
Avocado	½ small pear	100	245	—	1.7	—	26.4	—	5	5.11	19.98	3.29	—	—
Eggs	1 medium	54	77	6.1	—	5.5	—	340.0	—	1.64	3.58	1.19	0.16	0.13
Wheat germ	1 Tbsp. rounded	10	36	—	2.5	—	1.0	—	5	0.10	0.86	0.29	—	—

(—) indicates no figure available for calculating value.
— indicates no value.
* Figures taken from references (8, 14–25).
‡ Fatty acid values calculated from butter fat figures.
§ Fatty acid values for cocoa were not available and, therefore, are not included in the fatty acid figures given.
¶ All portions refer to raw, edible portions unless otherwise stated.
‖ Includes total digitonin precipitable sterols.
** For beef brain only.

rived from chemical analysis of the diets involved have concluded that the tables are sufficiently accurate to permit interpretation of dietary data from a reasonably large sample (10, 11).

Nevertheless, as our knowledge of nutrition and the interrelationships of various nutrients increases, it appears that food composition tables will become increasingly detailed. Indeed, any attempted correlation of dietary data with data regarding serum lipids demands a more detailed food composition table. Recently, the authors have found it necessary to compile a food value table indicating amounts of animal and vegetable fat, saturated and unsaturated fatty acids, essential fatty acids, animal and vegetable protein, and cholesterol in addition to the usual nutrients calculated. It is likely that future investigation into atherosclerosis might proceed along lines which would require even more detailed dietary calculations than this table presents. For example, vitamin B_6 (pyridoxine) has been implicated in the disease process of human atherosclerosis (12). Various tables of the vitamin B_6 content of foods have been published (13). Pyridoxine values, however, were not included in the table presented here, because the vitamin is unstable to heat and light (13), especially in solution, and little is known of the extent of this loss.

The present table does not represent original analyses of foods by the authors, but is a compilation of data from various sources (8, 14–25). The nutrient values for foods of mixed animal and vegetable origin were based on standard recipes (26, 27). Most of the cholesterol values were taken from Okey (15), although additional sources of cholesterol data were used in some cases. The United States Department of Agriculture was the chief source of data relating to calories, protein, fat, and carbohydrate. Hilditch (20) served as the major source for the fatty acid content of foods.

Many items of vegetable origin were omitted from the table because cholesterol and fat are either absent or present in very small amounts in such foods. Some animal foods had to be omitted due to lack of reliable data regarding their cholesterol and fatty acid content. Vitamin and mineral values were excluded from the table, since these values are readily available from standard references, such as Agriculture Handbook No. 8 (8). The table is, therefore, by no means complete, but it is hoped that other workers will find it useful either in its present form or as a basis for developing their own tables.

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Antibiotics in the Preservation of Fresh Meat[1]

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MEAT SPOILAGE may be thought of as deep spoilage and surface spoilage. Work of Lepovetsky (1) provides evidence that immediately following slaughter, muscle tissue has a very low bacterial count. Most of the microorganisms were found in the lymph nodes. Because the anti-bacterial processes of the live animal are no longer functioning, the bacteria normally spread post-mortem from such points as the lymph nodes to other areas.

Bacteria of the genus Bacillus are commonly identified as causative agents of deep spoilage. Evidence of this type of spoilage is a characteristic pungent, putrified odor, and the trade refers to the condition as "sour."

Surface contamination of meat begins with the first stroke of the skinning knife and continues through contact with equipment, hands, and air until ultimate disposition or consumption of the product. Aerobic, psychrophilic microorganisms, especially the group of bacteria known as the pseudomonads, are the predominant trouble makers which grow on fresh meat stored under what is normally considered to be adequate refrigeration (2). Favored avenues of bacterial invasion below the surface are blood vessels, which provide excellent media for bacterial growth, and intermuscular areas which are characterized by loose connective tissue. Discoloration, sliming, and offensive odors are our most practical methods of detecting surface spoilage.

To the meat processor spoilage is an ever-present problem. Pork is recognized as being highly perishable, and even under the most favorable conditions, the four- or five-day time lag between slaughter and cooking is inviting surface spoilage. The very thickness of beef carcasses calls for special attention to reduce the internal temperature from 102° F. to about 60° F. within 24 hr. after slaughter. Slower chilling encourages the growth of Bacilli bacteria. Veal, devoid of the dry, protective barrier of cover fat, also is included in the highly perishable classification.

Processing and merchandising such a highly perishable product as meat requires the utmost in careful handling and clockwork procedure. Variation from such precautions results in less desirable flavor, a possible decrease in nutritive value, loss of product and time when spoilage necessitates trimming and, in scattered instances, complete loss of the contaminated product.

The current trend in merchandising forms quite a contrast with the old-style butcher shop of a few years ago. As the butcher satisfied each customer's requirements by slicing a steak from the round or cutting a chuck roast, he automatically sold the surface which had been exposed the longest time and the wholesale cut with its freshened surface was returned to the cooler to await the next customer. Today, however, we talk about prepackaging and perhaps centralized meat cutting at the packing house or at the purveyor's establishment with subsequent distribution to the hotel-restaurant-institutional trade or the retail markets. Notwithstanding the advantages accruing with this modern system, we cannot overlook the fact that the area of most surface being exposed to contamination is increased manyfold and, simultaneously, the time elapsing between cutting and cooking has lengthened. This method of merchandising places on every person along the chain a burden of responsibility to assure that the meat is handled expeditiously.

Preserving Meat

Two aids in keeping meat fresh and wholesome are procedures of long standing. They are sanitation and refrigeration. It seems unnecessary to elaborate on the importance of sanitation and the techniques involved. Refrigeration may be of varying degrees. Chilling at a temperature just above freezing is standard procedure, and it is effective in retarding growth of most organisms. However, most of the spoilage problems just discussed occur under these very conditions of refrigeration. More recently, freez-

[1] Presented at the 39th Annual Meeting of The American Dietetic Association in Milwaukee, on October 10, 1956.

[2] The author is grateful to H. H. Weiser and F. E. Deatherage for the information in Tables 1 and 2, respectively.

ing meat has become a prevalent practice. At temperatures below 10° F., bacterial spoilage is rare. But, to maintain this low temperature constantly requires a tremendous investment in refrigeration equipment for processing rooms, for transporting, and for storage facilities at the packing house as well as in the institution's kitchen.

Antibiotic Studies

Consequently, the search goes on for other methods which will be effective aids in preserving meat freshness and flavor. Currently under consideration is the use of antibiotics in fresh meat preservation. It is recognized that antibiotics do not kill the spoilage microorganisms, but they effectively inhibit their growth. Goldberg, Weiser, and Deatherage (3) tested numerous antibiotics and found that chloramphenicol (Chlormycitin[3]), chlortetracycline (Aureomycin[4]), and oxytetracycline (Terramycin[5]) at 2 p.p.m. were effective in delaying spoilage in ground beef. Lepovetsky *et al.* (1) screened these three antibiotics against 92 strains of microorganisms from 492 isolates of meat. Chlormycitin inhibited growth in 74 strains, Terramycin in 77, and Aureomycin in 81. Nine strains grew uninhibited by all three antibiotics.

In Ohio, antibiotic research is part of a broad program of meat investigation. Cooperating in this work are F. E. Deatherage, Department of Agricultural Biochemistry; H. H. Weiser, Department of Bacteriology; L. E. Kunkle, Department of Animal Science; and the author. This group has the ambition to spell out in rather fundamental terms just what comprises a good piece of meat and how meat can be improved from the standpoint of consumer acceptability.

Studies with Aureomycin

Following the aforementioned screening of antibiotics, Aureomycin was selected for further study with carcass beef. The vascular system of an animal is a made-to-order processing plant which may be utilized to alter the physical and chemical properties of fat and lean.

Initial trials were conducted using paired beef rounds which provided a control for each treated specimen. Physiologic saline containing 55 p.p.m. Aureomycin was pumped through the femoral artery into one of a pair of hot rounds at the time of slaughter (4). The first group of eight paired rounds were hung immediately in a 36°F. cooler. After 48 hr., detailed examination revealed both rounds were comparable in color, odor, taste, and *p*H. The deep seated popliteal lymph nodes were checked for bacteria with the results shown in Table 1.

A second group of ten paired rounds were given similar treatment except that the hot rounds were held at room temperature for 48 hr. All ten of the infused rounds appeared sound, seven of the control rounds exhibited at least a little off odor, and three of the seven were definitely sour. Bacterial counts of the lymph nodes and muscle supported the gross observations.

Whole animals were infused by way of the carotid artery immediately after stunning and bleeding before the hide was removed. Following infusion, which required 3 or 4 min., the customary slaughter procedures were continued. Spraying the carcass with the infusate did much to retard surface spoilage. This same principle of surface application can be used effectively on fresh surfaces of wholesale cuts and holds considerable promise for pork and veal.

For purposes of comparison, one side of each infused carcass was held at room temperature for 48 hr., and the other side was refrigerated immediately. Deep spoilage was not detected in any of the treated carcasses, and infusion did not noticeably alter color of lean. In most instances, the color of lean was improved as a result of delayed refrigeration. At five days post mortem, loin steaks from each of the sides were submitted to a taste panel. In each comparison, the delayed refrigeration had produced steaks more tender than corresponding steaks from the opposite side which had been chilled immediately (Table 2). No difference in flavor due to adding an antibiotic was detected.

[3] Trade mark of Parke Davis & Co.
[4] Trade mark of American Cyanamid Co.
[5] Trade mark of Chas. Pfizer & Co.

TABLE 1 Bacteria in the popliteal lymph nodes from infused and control paired rounds held at 3° C. for 48 hr. post mortem

BEEF ROUND NUMBER	ORGANISMS PER GRAM	
	Infused	Control
1	30	30
2	400	6000
3	30	30
4	30	450
5	30	1000
6	30	1600
7	30	1500
8	30	2000

TABLE 2 Tenderness of loin steaks from infused beef at 5 days post mortem, comparing immediate and delayed refrigeration

ANIMAL NUMBER	TENDERNESS	
	Immediate refrigeration	Delayed refrigeration
1	6.33	7.17
2	5.00	5.33
3	2.33	6.33
4	7.25	8.42
5	5.66	7.50
6	1.33	5.25
7	5.58	7.25

There may be advantages in administering the antibiotic to the live animal prior to slaughter. One method is to introduce the antibiotic, in a small volume of carrier, into the intraperitoneal cavity from which it is absorbed into the blood stream (5). Intravenous injection is a second method.

No Toxicologic Effects Reported

Naturally, when an additive is used in foods, the public health aspect is and should be one of the first questions to arise. It becomes necessary to know how the additive affects the food, how much residue remains, what becomes of it, and the effect it may have on the consumer.

When a known amount (2 p.p.m.) of Aureomycin was added to ground beef stored at 50°F., only a fraction of a p.p.m. remained after three days and none could be detected after four days (4). The same general picture was true when samples of infused rounds held at room temperature for two days after slaughter were analyzed for residue. The disappearance of the Aureomycin was less rapid at temperatures of 36° to 38°F. If meat were merchandised through customary commercial channels, however, little or no Aureomycin would remain when it reached the dinner table. As much as 23 p.p.m. Aureomycin in chicken breast muscle can be completely destroyed by boiling for 15 min. (6). Beef used in antibiotic studies has been consumed by known persons with no adverse effects being noted. (4).

Of course, we know that the Food and Drug Administration has given approval to the immersion of dressed poultry in an Aureomycin solution. The finished product must not analyze in excess of 7 p.p.m. Aureomycin. In the case of beef, only 5 p.p.m. is considered adequate for the temporary preservation desired. Even if the raw beef were eaten at the time of treatment, about ¾ lb. lean meat would yield about $\frac{1}{1000}$ of a daily therapeutic dose for an adult.

The question of selectivity with respect to microorganisms and use of antibiotics has not been completely clarified. In comparing poultry dipped in antibiotic solution with poultry which has not been treated, the same organisms (about 95 per cent pseudomonads) are present at the end of fourteen days and in each case are responsible for spoilage (6). Limited tests on the flora of treated and untreated beef rounds held at room temperature for nine days yielded no indication of selectivity.

Advantages of Antibiotic Preservation

Justification for the tremendous attention being given the antibiotic preservation of meat can be found in the ambition to make available to the consumer a product of higher quality and at a lower relative cost. Antibiotics should be used to maintain a higher degree of freshness and palatability of the meat placed on the dinner table. Their use should not be intended to prolong unnecessarily shelf life or be an excuse for careless distribution. Perhaps the economies of pre-packaging fresh meat at the wholesale level are within reach.

Whatever the domestic utility, our international neighbors stand ready to consider the possibilities under their own conditions. Needless to say, the cost of administering an antibiotic to a live animal or a carcass is insignificant compared with the investment necessary for adequate refrigeration. Few, if any, other countries in the world have sufficient refrigeration to process and merchandise meat according to our standards. The ability to transport and distribute meat with little or no refrigeration could improve immeasurably many inadequate diets.

Summary

It can be said that surface spoilage of meat is a problem and frequently a deterrent to efficient merchandising. Although the antibiotics discussed are not bactericidal, they are effective in inhibiting the growth of a large share of the organisms found in and on fresh meat. Color and flavor of meat are not changed by the use of appropriate antibiotics. These antibiotics disappear from meat during a four- or five-day storage period, and they are largely destroyed by cooking temperatures. Evidence is not yet available to indicate that resistant strains of bacteria will develop or that sensitive organisms become less sensitive when these antibiotics are used. Antibiotics complement and are not a substitute for strict sanitation, and adequate refrigeration in the processing and distribution of an appealing, flavorful, palatable, and nutritious domestic meat supply.

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Radiation Processing of Foods[1]

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AT THE turn of the nineteenth century, naturally-occurring and machine-produced radioactivity was discovered by Becquerel and Roentgen, respectively. Shortly thereafter, the bactericidal properties of ionizing radiation were observed. The killing of bacteria and other micro-organisms is the primary requisite for food sterilization. The idea of preserving foods by radiation in recent years has gained impetus throughout the country as evidenced by the numerous institutional and governmental reports, technical articles, and abstracts of study sessions which have appeared on this subject.

Highly qualified individuals have accepted the responsibility of examining critically the various aspects of the complex problems involved in radiation sterilization. Many points of view must be considered, ranging from extremely basic experimentation to an evaluation of its economic feasibility. The healthy state of affairs is reflected by a general agreement on the broad purpose and objectives of these efforts, and disagreement on lesser issues that must be expected in the development of a new technologic process. To date, much time, effort, and money has been invested to elucidate and study the problems. Although further investigations are needed, it is generally conceded that many of the pitfalls and drawbacks can be overcome. Within the next two decades, the radiation processing of foods will undoubtedly play a significant role in the dietary of the world population. This paper is an attempt to summarize some of the latest information available on the problems and present status of this new art (1–7).

Motivation

Several important advantages are contemplated from the irradiation of foods and provide the necessary motivation for the eventual application of these methods. *First*, it is known that relatively low levels of ionizing radiation will kill helminthic parasites. The most troublesome, the trichina, can be eliminated from fresh pork by ionizing radiation without changing the appearance and taste of the meat. This alone, besides the possible elimination of other food-borne diseases, provides a considerable potential in the lessening of the incidence of disease throughout the world. *Second*, the lack of refrigeration in many countries constitutes a grave problem in the distribution of perishables to hungry populations. Moderate amounts of radiation can lengthen the storage life of tubers, destroy insects that infest grains and cause huge losses, and kill insect larvae in certain fruits not presently allowable in interstate traffic for this reason. *Third*, the logistic support of our armed forces during periods of emergency requires the utmost in national effort. Any procedure that decreases this burden may be decisive. Sterilization of foods by radiation would not only effect a saving in space but also obviate the necessity for refrigeration. In addition, the advantages of supplying sterile, stable, and not overly processed foods to front line troops and hospital patients are obvious.

Fourth, the rapidly developing nuclear reactor program will provide a continuous source of irradiating material in the form of the fission by-products. Two of the radioisotopes in the fission mixture, strontium and cesium, have sufficiently long half-lives to be feasible for these purposes. The use of these fission products represents a promising outlet for otherwise waste materials, and their lease or sale to the food industry would further add to the economic practicality of nuclear reactors as power sources.

Acceptability

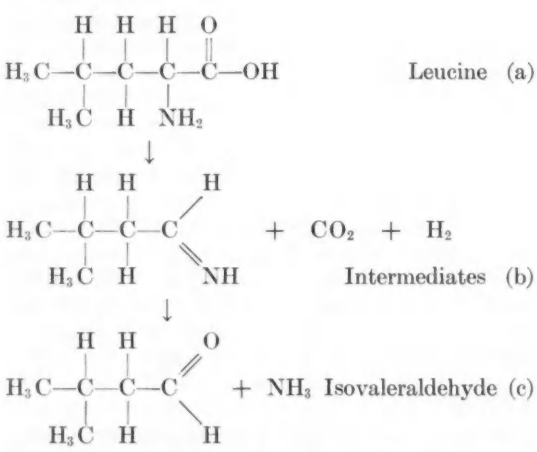
During the processing of foods with radiant energy, some of the food constituents undergo undesirable

[1] Presented at the annual meeting of the Tennessee Dietetic Association in Gatlinburg, on May 11, 1956.

degradative changes. Proteins with sulphur amino acid-containing peptides are ruptured to form malodorous mercaptans and sulphides; fats are broken down into peroxides and carbonyl compounds. These subtle and obscure changes are readily detected organoleptically although they are difficult to detect chemically. Certain types of products, especially meat, show pigment changes that are offensive to the gastronomically-atuned eye. Off-flavor, off-odor, and off-color formation in the radiation process is the greatest barrier to be overcome before these items can be mass marketed. Their control and elimination have received much attention in various laboratories, and an understanding of the mechanisms involved is being approached. Bellamy and Lawton (8) observed that, with samples irradiated dry, in air with 5×10^6 rep, individual proteins showed great differences in the formation of irradiation odor under similar irradiation conditions as shown in the tabulation below. Gelatin and albumin had the most odor after suspension in aqueous solution; attempts to correlate odor formation and the amino acid composition of the protein were not successful. When amino acids were irradiated, cysteine, cystine, methionine, and leucine were the most offensive.

Protein	Odor after suspension in water
Histone	very slight
Edestine	very slight
Bovine plasma albumin	strong
Gelatin	strong (different from albumin)
Hemoglobin	very slight
Casein	moderate
Enzyme hydrolyzed casein	very strong and unpleasant

These investigators have determined the mechanism by which irradiated leucine is degraded, which is shown as follows:



In the absence of water (a → b), carbon dioxide and hydrogen alone were formed; neither ammonia nor other nitrogenous compounds were observed. After the addition of water (b → c), an intermediate compound is further broken down to yield an aldehyde (isovaleraldehyde) and ammonia. Since the amino acid composition *per se* of the protein molecule is not critical in the production of odor, it was concluded that the order and position of the amino acids in the protein molecule are the important factors.

An extension of these observations concerns the variation in susceptibility of different foods to changes by ionizing radiation. For example, bread, liver, and green beans do not develop appreciable off-flavors and off-odors, but milk and other dairy products are particularly sensitive. If less than 10 per cent of the sterilizing radiation dose is delivered to milk, considerable off-flavor and off-odor are produced. Similar levels of radiation do not significantly affect meats, but with higher levels of radiation, i.e., sterilizing doses, these unacceptable flavors and odors generally occur.

Several methods have been proposed to protect foods from these undesirable changes. Since off-flavors and off-odors result from oxidative processes, the inclusion of certain natural antioxidants or reducing agents (cysteine or ascorbic acid) in foods before irradiation have proved valuable. Other procedures that offer possible protection are irradiation of the foods in the frozen state, under vacuum, under inert gases, after the elimination of dissolved gases, or combinations of these treatments.

Another problem of acceptibility deals with the enzyme constitution of the food itself. Spoilage is caused not only by bacterial activity but also by the enzymatic activity of the plant or animal tissue. In canning or freezing procedures, these enzymes are inactivated by heat, either in the thermal sterilization process or by blanching. Enzymes, unfortunately, are radioresistant. For example, five to thirty times the sterilizing radiation dose are required before the enzymes are inactivated. The most promising method for offsetting this disadvantage is to heat-blanch the food before the radiation process. Other methods of blanching are being considered that do not involve conventional heating.

Wholesomeness and Nutritional Aspects

In the initial animal feeding experiments to determine the wholesomeness of irradiated foods, irradiated-fed rats showed an impairment of fertility in males and increased mortality in the litters. These symptoms were readily alleviated by vitamin E supplements. These findings supported the hypothesis that the irradiation process is oxidative in nature and destroys natural antioxidants, such as vitamin E. Following these early studies, numerous reports have almost unanimously attested to the innocuous nature of irradiated foods. However, experimental animals raised on irradiated diets

generally gained slightly less weight than those on nonirradiated diets. On the other hand, no definite toxicity, new nutritional deficiency, reproductive anomaly, or change in the biologic value of foods has been demonstrated that could be conclusively attributed to the irradiation procedure. It is conceded, however, that the usual criteria of toxicologic tests may not be sufficiently sensitive to measure harmful changes, and research to develop further toxicity tests is underway.

At least forty different foods have been subjected to eight-week subacute toxicity evaluation. All foods proved completely satisfactory. Concurrent with short-term animal studies, extensive long-term feeding experiments are in progress. Some of the latter have gone through three and four generations with negative results. These long-range studies are necessary to eliminate the possibility of any carcinogenic properties in the irradiated foods and latent toxicologic manifestations. Two preliminary three-week human feeding tests have been completed in which volunteers ate 35 per cent of their diet as irradiated food. No differences were noted between the individuals fed irradiated meals and those fed nonirradiated meals (10). These experiments have been expanded in both the percentage of irradiated foods in the diet and the duration of the experimental periods (11).

The induction of radioactivity in foods by ionizing radiation does not constitute a hazard. Measurements of the irradiated foods with the most sensitive detectors reveal no induced activity. Also, intense gamma irradiation of twenty-four elements found in beef resulted in no secondary radioactivity in these elements (12).

Certain nutrients are extensively destroyed by ionizing radiation while others have proved quite resistant. Sterilizing doses of gamma radiation destroy large percentages of vitamin A, ascorbic acid, and tocopherols in milk. Carotenoids and riboflavin were moderately sensitive at high dose levels, but the enzyme, phosphatase, elicited the usual enzyme radioresistance. Certain vitamins in pure solutions are prone to destruction by radiant energy. Substances such as methionine and cysteine exhibit some sparing action on these radiosensitive compounds. In connection with these observations, much protection against massive micronutrient destruction is afforded by the complex materials in foods. In general, these problems are relatively minor since total destruction is not great in most foods, and resupplementation after sterilization can be accomplished.

Outlook for the Future

A survey on the status of the radiation sterilization of foods and drugs at various research institutions and commercial houses was recently completed (9). Consideration was given to the problems yet unsolved and the time before commercial feasibility would be attained was estimated. These are summarized in Table 1. The drug industry has been very active in this field, since radiation sterilization has many advantages for some of its products. Certain antibiotics, for example, are heat labile and are sterilized by prolonged, involved processes such as passage through bacterial filters. By instituting radiation procedures, such drugs can be sterilized in the package, assembly-line fashion. The toxicologic aspects of pharmaceutical applications are negligible, because extremely small amounts of these drugs will be administered as compared with the eventual daily intake of irradiated foods. Needless to say, much secrecy is maintained by the drug houses in this competitive field.

TABLE 1 Summary of present status of radiation processing*

PRODUCT	PRIMARY PROBLEMS NEEDING STUDY	ESTIMATED YEARS BEFORE COMMERCIALLY FEASIBLE
Potatoes	toxicology, economics, acceptability (color, flavor), large-scale production	1
Drugs	economics, clinical tests	1
Beer	side reactions, economics	5
Meat	acceptability (odor, color, flavor), technology, nutritive value, toxicology, economics	5
Grain	side effects	5
Packaged foods	side effects, technology, economics	5–10
Dairy products	acceptability (odor, color, flavor), effective radiation level	10

* See reference (9).

The irradiation of potatoes to inhibit sprouting and irradiation of grains to destroy insects may be commercially feasible within a year. The major problems to be overcome are conclusive nontoxicologic data, improvement of color and flavor, and the production of large-scale irradiation facilities. The availability of irradiated grains and certain cuts of meat may become a reality within five years. Side effects that cause off-flavors and off-odors need to be eliminated or reduced in these products. In addition, long-range animal experiments on the toxicity and nutritive value of irradiated meats must be completed, including studies with human subjects.

Five to ten years are estimated as necessary before packaged foods will be ready to be marketed. Here again, the production of off-flavor and off-odor is a problem; certain technologic difficulties inherent in the use of containers are also problems.

The most pessimistic outlook is in the area of dairy manufacturing. The main disadvantages, as

previously mentioned, are the susceptibility of these products to side-effects and the massive destruction of micronutrients. At least ten years of intensive research are estimated as necessary before these can be overcome.

There is no way of estimating precisely the cost of this technologic process. The indefinite variables are the type and dose of radiation and an efficient means of providing these radiations. The method must be feasible and competitive. According to authoritative estimates, the cost of many of the radiation sterilization procedures will closely approach that of present-day processing methods; at least they will be of the same order of magnitude. Handling costs after sterilization appear to be lower. In certain applications, however, the cost alone should not be the principal consideration in the commercial use of ionizing radiation in the food industry.

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Public Views Pork Dimly

Elmo Roper, well known researcher of public opinion, reported a survey of the public's attitude toward pork at the recent 51st convention of the American Meat Institute. His report, which was published in the October 13 issue of *The National Provisioner*, points up the "folklore" that pork is considered "fattening" or "fatty."

In describing his methods, Mr. Roper said, "We tried in this questionnaire to arrive at a variety of things. We tried to give people a chance to say in their own words what they thought about pork. Then we asked specific questions, and we also tried giving them words, asking which of the words came closest to their attitude about pork. We asked them what they had done the last time they had four people or a large dinner, and then we asked them what they would do in another imaginary situation if they were about to entertain for four, eight, or so forth. We also had word association tests in which we listed a lot of words and said, 'Pick out all the words you think apply to beef; pick out all the words that apply to pork, veal, and lamb.' We approached this whole thing from a great variety of directions."

Pork was found to rate low by comparison with other meats, primarily because of the fat element. Reservations concerning pork, according to Mr. Roper, can be divided into two large groups—those pertaining to an over-all heading of "fat," and the other pertaining to "health."

Under the heading of "fat," a number of people felt that pork was not only more fattening than beef or lamb, but that it is actually a very fattening meat. Somewhere between 4 and 17 per cent felt that pork is definitely fattening, and still more that it is "somewhat fattening." As a fattening food, more than half of the 43 per cent of the women and one-third of the entire population who "watch their weight" try to avoid pork.

Another part of the story is the criticism that pork is fatty—that it looks fatty or greasy.

The association of fat with pork cropped up also in the various "health" criticisms leveled at it. A number considered pork "less nourishing," "less safe," and "less digestible." On further questioning, the reasons for such beliefs appeared again to be the fat element.

A third factor in pork's unpopularity seemed to be the fact that it has a low social status. When it came to the word association test, Mr. Roper found that beef is associated with athletes, bankers, and slim, beautiful women, but that pork seems to "go with" farmers, poor people, truck drivers, and people with very large families.

Effect of Holding Time on Bacteria in Chicken Casserole[1]

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The result of delayed cooking in an automatic oven indicate that chicken noodle casseroles may be held for as long as 4 hr. before cooking. Longer holding periods prior to cooking are not recommended

THE EFFECT of delayed cooking in an automatic oven on the bacteria in meat loaf has been reported (1). The study has been extended to include casserole dishes, since these "one-dish" meals are popular with the busy homemaker, but are sometimes associated with outbreaks of food poisoning.

Certain characteristics of casserole dishes may make them potential sources of danger to the consumer. They are often prepared to use leftovers, where bacterial development may already be well in progress. In addition, since most recipes call for precooked ingredients, the baking times and temperatures used are often merely the minimum necessary for reheating. In instances where bacterial contamination prior to cooking is high, this amount of heating may not be sufficient to destroy harmful bacteria or thermostable toxin.

A bacteriologic study of chicken noodle casseroles was undertaken to determine whether temperatures and holding conditions employed by the housewife using an automatic oven might be dangerous.

Experimental Procedure

SERIES 1—UNINOCULATED CASSEROLES

An amount of the test product sufficient for four family-sized casseroles was prepared from the following recipe:

Margarine	75 gm.
Diced green pepper	170 gm.
Diced pimiento	100 gm.
Flour	75 gm.
Salt	18 gm.
Pepper	to taste
Milk	632 ml.
Chicken broth	632 ml.
Egg noodles	303 gm.
Diced cooked chicken	600 gm.
Buttered bread crumbs	180 gm.

Cook noodles and drain. Melt margarine in sauce pan, add green pepper and pimiento, and cook slowly for 10 min. Blend in flour. Gradually add broth and milk to make sauce. Add seasonings, drained noodles, and diced chicken to sauce and mix well. Pour into greased 1½-qt. casserole and top with buttered crumbs. Bake, uncovered, in 350°F. oven for 40 min. (Oven-proof glass baking dishes, 2½ in. deep and 6½ in. in diameter were used in this study.)

The bread crumbs were prepared several days in advance and stored in the refrigerator in a covered container. Noodles, milk, green pepper, and pimiento were purchased on the day of use. Before beginning the study, a number of cockerels were frozen and then thawed as they were needed by holding in the refrigerator for 48 hr.

Since the method of preparation would affect bacterial growth, two procedures which might commonly be used by homemakers in preparing casseroles were investigated. The first represented conditions that would prevail if the casseroles were prepared in ad-

[1] Contribution from Montana State College, Agricultural Experiment Station. Paper No. 391 Journal Series.

vance and refrigerated until ready for use; the second assumed that the casserole was prepared immediately before it was put into the automatic oven. The laboratory procedures which were used to simulate these home methods are described below.

Sufficient chicken for eight casseroles was cut into serving-sized pieces, simmered in water until tender, removed from the broth, allowed to cool at room temperature for 1 hr., and then diced. Four casseroles were prepared immediately, covered with self-sealing paper, placed in the refrigerator, and held until needed the following day. The remaining diced chicken was covered and also stored in the refrigerator. On the following day (after approximately 20 hr.), the diced chicken was removed from the refrigerator and four additional casseroles were prepared. Those casseroles made the previous day were also removed for holding at this time. The two groups are hereafter referred to as "freshly prepared" and "refrigerated" casseroles.

Two holding temperatures and two holding times were chosen to represent the different conditions which might be encountered in the use of the automatic oven. Accordingly, of the four "freshly prepared" casseroles, two were placed in cold ovens and two were placed in warm ovens (oven temperature brought to 150°F. and then shut off when casseroles were placed in oven for holding). One casserole at each oven temperature was held 4 hr. and then cooked, and the other was held for 8 hr. and cooked. The casseroles were baked in a 350°F. oven for 40 min. The four "refrigerated casseroles" were treated in the same manner. In this series, the two methods of preparation, the two oven temperatures, the two holding times, and the three replications of each treatment required the preparation of a total of twenty-four casseroles.

The sampling and bacteriologic techniques used were similar to those published previously for meat loaves (1). Bacterial counts were made on the chicken immediately after dicing, on the casseroles just prior to refrigeration and after 20 hr. refrigeration, and on the freshly prepared casseroles as soon as they were mixed. Samples were also removed from casseroles for bacterial testing after 4 or 8 hr. of holding and after cooking. The internal temperatures were determined by thermocouples and recorded just prior to and after 4 and 8 hr. holding in the automatic oven.

SERIES 2—INOCULATED CASSEROLES

The chicken was prepared and diced as in Series *1* and then divided into four lots of 2 cups each. Inoculations were made at this time, since it was assumed that the most likely time of contamination would be during the dicing of the chicken. One lot was left uninoculated as a control; the remaining three lots were inoculated with *Micrococcus pyogenes* var. *aureus*, *Streptococcus faecalis*, and *Salmonella typhimurium*,[2] respectively. Each lot was further divided in half and placed in casserole dishes making a total of eight dishes. These casseroles were then covered, placed in the refrigerator, and held until the following morning (approximately 20 hr.). At that time they were removed, and a proper quantity of freshly made chicken noodle casserole recipe (with diced chicken omitted) was added to each. The eight casseroles were then divided into two groups, each containing a control and one each of the three different inoculation treatments. One group was held for 6 hr. and then cooked; the second group was held for 8 hr. and then cooked. All casseroles were placed in a warm 150°F. oven, and the heat was turned off. After the holding period the casseroles were baked as in Series *1*. Samples were removed for bacterial plate counts and temperatures were recorded as before. The temperatures at the time of removal from the oven and at three 10-min. intervals after removal were determined by thermocouples.

Results and Discussion

SERIES 1—UNINOCULATED CASSEROLES

The internal temperatures of the casseroles at the various stages of preparation and holding were of special concern in this investigation. Jensen (2) reports that when foods are held between 50°F. and 120°F. for 4 to 8 hr. they are in the incubation zone for bacteria associated with food poisoning. In this study, the internal temperatures of the casseroles reached the incubation zone between the first and second hours of holding and reached the zone of optimum growth, 70°F. to 100°F., between the third and fourth hours (*Fig.* 1).

Results of the bacteriologic plate counts of the three replicates were averaged logarithmically and are presented in Figure 2. Overnight refrigeration resulted in some reduction in numbers of bacteria, with a corresponding increase after 4 hr. holding. The bacteria had apparently been in the lag phase for most of the 4 hr., and therefore exhibited little growth. Since similar results were found in the meat loaf study (1), it may be assumed that there is little likelihood of food poisoning from chicken noodle casseroles held 4 hr. under these conditions.

During the 8-hr. holding period, the internal temperatures of the casseroles were within the incubation zone for many bacteria for at least 6 hr., and within the optimum zone for growth for about 4 hr. (*Fig.* 1). In spite of these favorable conditions, bacterial development was slow, and the greatest num-

[2] Cultures of a coagulase-positive *Micrococcus pyogenes* var. *aureus*, strain 210, and *Streptococcus faecalis*, strain R-5, were supplied through the courtesy of Dr. C. F. Niven, Jr., of the American Meat Institute Foundation, University of Chicago. The culture of *Salmonella typhimurium* was supplied through the courtesy of Dr. J. L. Stokes, U. S. Department of Agriculture, Agricultural Research Service, Western Utilization Research Branch, Albany 10, California.

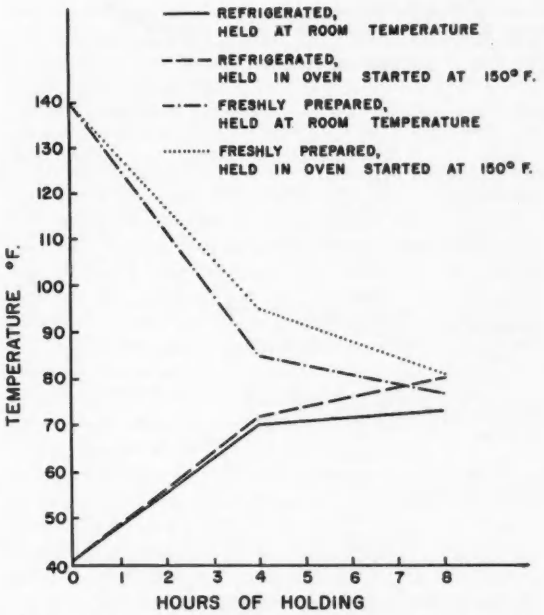
REFRIGERATED, HELD AT ROOM TEMPERATURE
REFRIGERATED, HELD IN OVEN STARTED AT 150° F.
FRESHLY PREPARED, HELD AT ROOM TEMPERATURE
FRESHLY PREPARED, HELD IN OVEN STARTED AT 150° F.
TEMPERATURE °F.
HOURS OF HOLDING

Fig. 1. Mean internal temperature of chicken casseroles after 4 and 8 hr. holding under various conditions.

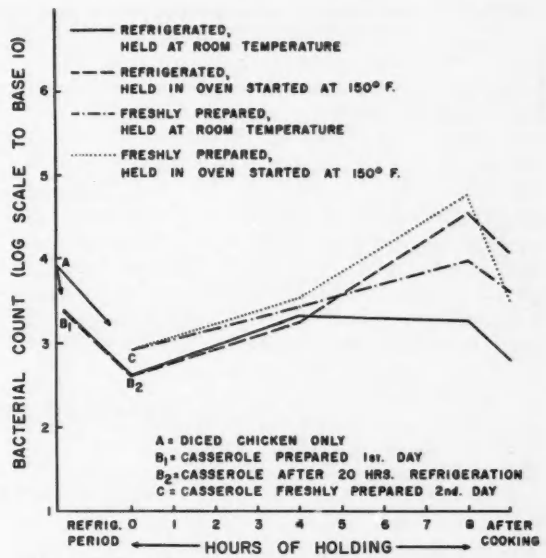
REFRIGERATED, HELD AT ROOM TEMPERATURE
REFRIGERATED, HELD IN OVEN STARTED AT 150° F.
FRESHLY PREPARED, HELD AT ROOM TEMPERATURE
FRESHLY PREPARED, HELD IN OVEN STARTED AT 150° F.
BACTERIAL COUNT (LOG SCALE TO BASE 10)
A = DICED CHICKEN ONLY
B1 = CASSEROLE PREPARED 1st. DAY
B2 = CASSEROLE AFTER 20 HRS. REFRIGERATION
C = CASSEROLE FRESHLY PREPARED 2nd. DAY
REFRIG. PERIOD
HOURS OF HOLDING
AFTER COOKING

Fig. 2. Logarithmic averages of numbers of bacteria per gram chicken casserole at various stages of preparation, and after 4 and 8 hr. holding under different conditions.

bers observed were less than 100,000 organisms per gram. This would indicate that under the conditions of this series of tests, few organisms survive the various treatments involved in preparing the casseroles. Baking the casseroles further reduced the numbers of bacteria.

SERIES 2—INOCULATED CASSEROLES

In Series *2*, casseroles were inoculated with organisms suspected of causing food poisoning and compared with uninoculated control casseroles after 6 and 8 hr. of holding, and after cooking. Results of bacterial plate counts and temperature recordings are shown in Tables 1 and 2, respectively.

Control Casseroles

The bacterial counts obtained on tryptone glucose extract (TGE) agar and the medium selective for micrococci (TGE plus 10 per cent salt) indicated that most of the microorganisms present in the chicken casserole immediately after mixing (0 hr.) were micrococci—or at least were organisms which could tolerate the high-salt concentration of the medium. The numbers of bacteria growing on TGE agar increased about 1,000 times (approximately 6,000 to 4 million per gram) during the 8-hr. holding period. These counts were considerably greater than those for the corresponding casserole in Series *1*. The bacteria present on the medium selective for micrococci, however, showed little increase after 6 or even 8 hr. The few streptococci initially present increased to only several hundred after 8 hr. holding, as determined by the SF agar (*S. faecalis* broth plus 1.5 per cent agar). No salmonellae were found on the SS medium selective for those organisms at any stage of the preparation or holding. Cooking to approximately 135°F., the temperature reached in the casseroles after 40 min. at 350°F. (Table 2), did not destroy all of the microorganisms in the control casseroles, but in most cases it did reduce their numbers to levels permissible for pasteurized milk.

Casseroles Inoculated with Micrococci

At the time these inoculated casseroles were placed in the oven for holding (0 hr.), about 180,000 organisms per gram of casserole were found using TGE agar, and approximately 44,000 were present when the TGE plus salt medium was employed. Subsequent holding in the prewarmed oven resulted in increases to about 2 million and 13 million organisms per gram on the TGE agar after 6 and 8 hr., respectively. The bacterial counts on the selective medium indicated the presence of about 600,000 and 2 million cells per gram after the 6 and 8 hr. holdings. Bacterial tests made on the baked casseroles showed that from 25,000 to 50,000 organisms survived, as determined by the TGE medium, but only a few hundred were micrococci (TGE agar plus salt).

Evans, Buettner, and Niven (3) have indicated that any food found to contain relatively large numbers of coagulase-positive micrococci should be considered dangerous for human consumption. Although cooking reduced the numbers of micrococci to a few hundred per gram, the thermostable toxin, which might be produced by these organisms during a 6- or 8-hr. holding period, probably would not be affected.

TABLE 1 Logarithms of average numbers of bacteria per gram of diced chicken, uninoculated and inoculated chicken casseroles held in an automatic oven 6 or 8 hr., and then cooked*

PLATING MEDIUM	BACTERIA PER GRAM					
	Diced chicken†	Casserole after holding			Casserole cooked after holding	
		0 hr.‡	6 hr.	8 hr.	6 hr.	8 hr.
Control (no inoculation)						
TGE#	3.7	3.8	5.2	6.6	3.8	4.6
TGE plus 10% NaCl	3.5	3.4	3.0	4.0	3.1	3.0
SF¶	none	0.9	2.0	2.8	1.0	2.6
SS§	none	none	none	none	none	none
Inoculated with Micrococcus pyogenes var. aureus 210						
TGE	7.3	5.3	6.3	7.1	4.4	4.7
TGE plus 10% NaCl	7.0	4.6	5.8	6.3	2.9	2.5
Inoculated with Streptococcus faecalis R-5						
TGE	5.4	4.2	7.8	8.3	4.6	5.0
SF	5.3	3.9	7.7	8.2	4.3	4.8
Inoculated with Salmonella typhimurium						
TGE	6.9	4.8	6.6	7.6	4.2	3.2
SS	5.6	1.0	4.1	5.3	none	none

* Three replications.

† Uninoculated chicken sampled immediately after dicing; remaining chicken sampled immediately after inoculation.

‡ Sampled immediately after mixing.

Tryptone glucose extract agar.

¶ *Streptococcus faecalis* broth plus 1.5% agar.

§ *Salmonella-Shigella* agar.

Casseroles Inoculated with Streptococci

Inoculation of the diced chicken with *S. faecalis* brought the number of these cells as determined on SF agar to about 200,000 per gram. Analyses of the casseroles prepared and sampled the following day immediately before holding gave plate counts of less than 10,000 per gram on SF agar. Growth was very rapid during the holding period, however, with the numbers of bacteria present on SF agar increasing to over 50 million after 6 hr., and to more than 150 million after 8 hr. The casserole medium appeared to be very favorable for these bacteria. Inasmuch as the optimum incubation temperature for these streptococci is about 45°C. (113°F.), it can be seen from Figure 1 that the temperature of the casserole during the holding period afforded an excellent opportunity for the growth of these organisms. Cooking did not destroy all the streptococci. The casseroles baked after 8 hr. holding still showed about 90,000 viable cells per gram, approximately 60,000 of which were identified as being streptococci on the selective medium.

The role of *S. faecalis* in food poisoning is still not clear. Dack (4) states that in outbreaks of streptococcus food poisoning, large numbers of the organisms are apparently required to initiate illness. It is doubtful that the 60,000 streptococci per gram which survived the baking process would be sufficient to cause food poisoning.

TABLE 2 Mean internal temperatures of casseroles at various times during tests

TIME PERIOD	TEMPERATURE
Holding Prior to Cooking	
0 hr.	128°F.
6 hr.	93°F.
8 hr.	91°F.
During Cooking*	
After 20 min.	101°F.
After 30 min.	117°F.
After 40 min.	135°F.
After Cooking*	
After 10 min.	145°F.
After 20 min.	143°F.
After 30 min.	140°F.

* Mean for temperatures for casseroles held 6 and 8 hr. combined.

Casseroles Inoculated with Salmonellae

Bacterial plate counts made on diced chicken sampled immediately after inoculation with *Salmonella typhimurium* showed the number of these organisms to be approximately 430,000 per gram. The casseroles prepared the following day, using this diced chicken and sampled just prior to holding, gave counts of only about 10 cells per gram. During the holding periods of 6 and 8 hr., the numbers of bacteria determined by the selective SS agar were 14,000 and 19,000 respectively. Several thousand organisms sur-

vived after baking, but all *Salmonella typhimurium* were apparently destroyed. Hence, it appears unlikely that food poisoning would result from eating the baked casseroles.

Summary

In order to observe the effect of delayed cooking on the bacterial content of chicken noodle casserole, two series of tests were made. In the first, uninoculated casseroles were prepared by two different methods and held under two different conditions for 4 and 8 hr. in automatic ovens prior to cooking. The casseroles were cooked at the end of the holding periods, and the numbers of organisms surviving were determined. Bacterial plate counts were made, and the internal temperatures of the casseroles were recorded at various intervals during the preparation and holding of the casseroles, and also after cooking.

The results of this series indicated that chicken noodle casseroles could be held in a warm oven for 4 hr. prior to cooking with very little increase in numbers of bacteria. The 8-hr. holding period and the temperatures used provided favorable conditions for bacterial growth, but relatively few organisms resembling food poisoning strains were found. Apparently, most bacteria did not tolerate the refrigeration and heat treatments involved in preparing the casseroles, and many of those developing during the holding periods were destroyed by cooking.

In the second series of tests, one method of preparation and one holding condition were selected from the first series for further study with inoculated casseroles. *Micrococcus pyogenes* var. *aureus*, *Streptococcus faecalis*, and *Salmonella typhimurium* were employed, and the holding times were 6 and 8 hr., followed by baking.

Results showed that about 600,000 to 2 million micrococci per gram of casserole were present after 6 and 8 hr. holding. Although cooking reduced the numbers of bacteria considerably, any enterotoxin which might have been formed by the micrococci during the 6- or 8-hr. holding would probably not have been destroyed. These extended holding periods would thus appear to be potentially dangerous, if a casserole became heavily contaminated with food poisoning micrococci during its preparation.

The chicken noodle medium was very favorable for the growth of the streptococci employed, and the casseroles contained about 150 million of these organisms per gram after 8 hr. holding, and 60,000 per gram after baking. Though the role of *S. faecalis* in food poisoning remains unsolved, it is unlikely that this number of survivors would be dangerous.

Since cooking apparently destroyed all the salmonellae added to the medium, *Salmonella typhimurium* does not appear to be a likely source of food poisoning in chicken noodle casseroles.

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How to Store Salad Vegetables

Ration duration is a continuing problem in the Navy, and the long-range naval craft have heightened the demands for longer shelf-life. Since fresh, salad-type vegetables have obvious nutritional advantages, methods of extending their storage life were studied by Department of Agriculture researchers—H. T. Cook, C. S. Parsons, and L. P. McColloch.

The following are representative of the results obtained. About 70 per cent of the cabbage stored at 32° or 38°F. remained usable after eight weeks. Quality was best at 32°F. Celery kept longer at 32°F. than at 38° to 45°. After eight weeks, more celery was usable at 32° than at 38°F., and none was edible after six weeks at 45°. Polyethylene bags or crate liners lengthened storage life at both 32° and 38°F.

Lettuce trimmed of outside wrapper leaves before storage kept better for six weeks at 32°F. than at 38° or 45°. At 45°F., no usable lettuce remained after six weeks' storage. Here again, polyethylene bags or crate liners increased the storage life.

In general, the tests demonstrated that cabbage, celery, and lettuce retained better quality and are available longer at 32°F. storage temperature than at the higher temperatures now used on ships.

Tests showed that tomatoes could be kept up to six weeks if loaded at a mature-green stage, kept at 55° to 65°F. while ripening, and then stored at 32° or 38°F. until used. Although the tomatoes would be available longer if ripened at 55°, they would have the best quality if ripened at 65°F. Ripened tomatoes kept better at 32° than at 38°F., but in either case, they must be used immediately after storage.—*From Technical Program and Abstracts, Food Technology 10: 29 (May), 1956.*

Vitamin B_6 and Reproduction[1]

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Effect of vitamin B_6 deficiency on fetal and maternal weight, maternal nitrogen retention, liver protein synthesis, serum protein, and nonprotein nitrogen concentration in the rat

IN SEVERAL laboratories, the relationship of vitamin B_6 to protein metabolism in animals has been investigated (1–8). These investigations indicate that a variety of enzymatic disturbances involving amino acids may occur in vitamin B_6 deficiency states which result in impaired protein metabolism. The effects of vitamin B_6 deficiency on reproduction in the rat have also been reported (9, 10) with the observations that poor reproductive performance occurred only when animals were depleted of their vitamin B_6 stores prior to mating. The general criteria used in evaluating reproductive performance were: maternal weight gain, average fetal weight, number of live young per litter, and incidence of resorption. Since reports on the relationship of protein intake to reproductive performance have appeared in the literature (11–14) and have also been observed in our laboratory (15, 16), we were interested in studying some of the interrelationships of vitamin B_6, protein metabolism, and reproductive performance. In addition to the generally accepted gross criteria used to evaluate dietary adequacy during reproduction, we were also interested in observing maternal nitrogen retention, liver weight, liver nitrogen, liver moisture content, and the protein and nonprotein nitrogen of the maternal serum.

Our studies were designed to investigate the effects on reproduction of a vitamin B_6 deficiency instituted at and prior to conception. In other words, the experimental animals were divided into two main groups: the non-depleted and the depleted groups. Animals in the non-depleted group were placed on a vitamin B_6-deficient basal ration plus one of the five supplements shown in Table 1 on the day mating was confirmed by the presence of sperm in the vaginal smear. The depleted animals received the same basal ration plus 0.5 mg. per cent desoxypyridoxine for at least seven days before mating. The length of the depletion period varied from seven to thirty days because of irregularity of estrous cycles in the animals maintained on the vitamin B_6-deficient ration. The morning mating was confirmed in these animals, they were randomly divided, as were the non-depleted animals, and were given one of the five dietary supplements. Thus, groups of depleted and non-depleted animals were maintained during pregnancy on each of the five dietary supplements.

TABLE 1 Supplements incorporated in vitamin B_6-deficient basal ration

DIET	DESOXYPYRIDOXINE	PYRIDOXINE
	mg./100 gm.	*mg./100 gm.*
1	0.5	0
2	0	0
3	0	0.4
4	0	0.8
5	0	1.2

On the twenty-second day of gestation, each animal was anesthetized, the heart exposed, and blood for immediate serum analyses was taken by heart puncture. The liver was removed, weighed, and frozen for later analyses. The young were removed and the number of live young per litter, the weight of the individual young, and the number of resorptions were recorded. Details of the analytical procedures have been presented elsewhere (17, 18).

General Reproductive Performance

Maternal weight gains of over 100 gm. and average fetal weights of 5 gm. or more are considered criteria

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TABLE 2 **Average maternal weight gain, fetal weight, litter size, and resorptions**

PYRIDOXINE SUPPLEMENT	NON-DEPLETED ANIMALS*				DEPLETED ANIMALS†			
	Total weight gain	Fetal weight	Live young	Resorptions	Total weight gain	Fetal weight	Live young	Resorptions
mg./100 gm.	*gm.*	*gm.*			*gm.*	*gm.*		
0‡	61 ± 7℣	4.3 ± 0.5	9.8 ± 0.7	0.8 ± 0.3	38 ± 3	2.8 ± 0.1	10.1 ± 0.7	1.0 ± 0.3
0	67 ± 4	4.7 ± 0.1	8.4 ± 0.9	1.7 ± 0.7	55 ± 5	3.3 ± 0.2	9.6 ± 1.0	2.0 ± 0.8
0.4	111 ± 6	5.2 ± 0.1	10.5 ± 0.9	0.1 ± 0.1	85 ± 6	4.3 ± 0.2	8.4 ± 1.0	0.3 ± 0.2
0.8	115 ± 6	5.5 ± 0.2	9.3 ± 1.0	0.1 ± 0.1	90 ± 8	3.5 ± 0.5	8.4 ± 1.5	2.3 ± 0.7
1.2	109 ± 4	5.3 ± 0.2	8.3 ± 0.3	0.4 ± 0.1	99 ± 5	4.0 ± 0.7	8.9 ± 0.8	1.8 ± 0.7

* Ten or eleven animals per group.
† Seven or eight animals per group.
‡ Plus 0.5 mg. desoxypyridoxine per 100 gm.
℣ Standard error of the mean.

of good reproductive performance (14, 19). These criteria were met only by the non-depleted animals maintained on pyridoxine-containing rations during gestation (Table 2). Statistically, the differences in weight gain due to both diet and depletion were significant (P = 0.01). Although there were significant differences in weight gains between the non-depleted and depleted groups receiving pyridoxine, the differences observed on the three levels of pyridoxine within each of the main groups were not significant. There was also an interaction between the effects of the diets and depletion (P = 0.01); that is, the effect of desoxypyridoxine and the level of pyridoxine in the ration was different in the non-depleted and depleted animals.

A significant finding was that the average weights of the young from the depleted mothers maintained on diets containing pyridoxine were as low or lower than those of the young from the non-depleted animals maintained on the desoxypyridoxine-supplemented diet during gestation. Analysis of variance showed that the differences in fetal weights were significant for the effects of depletion and for the effects of the desoxypyridoxine-supplemented and pyridoxine-free diets (P = 0.01).

The incidence of resorption was relatively high in all of the depleted animals and in the non-depleted animals on the pyridoxine-deficient diets. These differences in number of resorptions were statistically significant due to the effects of depletion (P = 0.01) and of diet (P = 0.05).

Our results also indicate that the number of young per litter is not a valid criterion for judging reproductive performance. Statistical analysis of the data for litter size showed that there were no significant differences in the number of young produced by the mothers in the non-depleted or depleted groups, nor among the animals maintained during pregnancy on the different diets.

Nitrogen Retention

Depletion of the maternal vitamin B_6 stores prior to mating and/or pyridoxine deficiency during pregnancy resulted in marked decreases in maternal nitrogen retention (Table 3). When the differences were tested statistically, they were significant for depletion (P = 0.01) and for the desoxypyridoxine-supplemented and pyridoxine-free rations (P = 0.01). The level of pyridoxine in the ration produced no statistically significant effect on nitrogen retention within the two main groups. The animals receiving pyridoxine-deficient rations during gestation ate less than the animals maintained on the pyridoxine-supplemented rations. However, the differences in food consumption were statistically significant only for the desoxypyridoxine-supplemented and pyridoxine-free rations (P = 0.01). The low nitrogen retentions, therefore, may have been due to the decreased caloric intakes of these pyridoxine-deficient animals since low caloric intake has been shown to have a limiting effect on nitrogen retention (16, 20). However, the caloric and nitrogen intakes of the animals receiving pyridoxine during gestation were the same, but the nitrogen retention was markedly decreased in the animals depleted of their vitamin B_6 stores prior to mating. Therefore, it would appear that the decreased nitrogen retentions resulted from impairment in nitrogen metabolism which, in the pyridoxine-deficient animals, was superimposed on the limitations induced by a reduction in caloric intake.

TABLE 3 **Average food intake, percentage nitrogen retention, and length of depletion period**

PYRIDOXINE SUPPLEMENT	NON-DEPLETED ANIMALS*		DEPLETED ANIMALS†		
	Food intake	Nitrogen retention	Food intake	Nitrogen retention	Days of depletion
mg./100gm.	*gm.*	*%*	*gm.*	*%*	
0‡	126±6℣	15.3	115±6	4.1	12±1
0	132±6	15.6	133±5	8.1	14±2
0.4	171±7	26.0	166±7	16.2	14±2
0.8	167±5	24.2	168±6	11.6	19±3
1.2	162±4	24.6	178±7	14.4	16±3

* Ten or eleven animals per group.
† Seven or eight animals per group.
‡ Plus 0.5 mg. desoxypyridoxine per 100 gm.
℣ Standard error of the mean.

TABLE 4 **Average weight and nitrogen content of maternal livers**

PYRIDOXINE SUPPLEMENTS	NON-DEPLETED ANIMALS*		DEPLETED ANIMALS†	
	Weight‡	Nitrogen ※	Weight‡	Nitrogen ※
mg./100 gm.	*gm./100 gm. body weight*	*mg./100 gm. body weight*	*gm./100 gm. body weight*	*mg./100 gm. body weight*
0‖	3.539 ± 0.181¶	388 ± 14	3.784 ± 0.102	446 ± 9
0	3.002 ± 0.139	366 ± 17	3.392 ± 0.099	395 ± 8
0.4	3.083 ± 0.079	365 ± 10	3.338 ± 0.114	401 ± 10
0.8	3.084 ± 0.107	367 ± 10	3.529 ± 0.096	417 ± 11
1.2	3.192 ± 0.015	383 ± 13	3.392 ± 0.068	415 ± 8

* Ten or eleven animals per group.
† Seven or eight animals per group.
‡ Wet basis.
※ Dry basis.
‖ Plus 0.5 mg. desoxypyridoxine per 100 gm.
¶ Standard error of the mean.

Liver Moisture and Nitrogen Content

There was no marked difference in the average moisture content of the maternal livers. The values for all the groups ranged from 72.6 to 73.9 per cent.

Liver weights and nitrogen contents were calculated on the basis of 100 gm. body weight since the weights of the animals at term were different. On this basis, statistically significant increases in the ratios of liver weight and nitrogen content to body weight were observed in all the animals subjected to prior depletion ($P = 0.01$) and in the non-depleted animals maintained on the desoxypyridoxine-supplemented ration during the gestation period ($P = 0.05$). Pyridoxine supplementation of the depleted animals caused a lowering of the ratios of liver weight and liver nitrogen to body weight (Table 4). However, the decreased ratios did not attain the lower values observed for the non-depleted animals maintained on the corresponding diets.

This is a further indication that the maternal organism cannot completely overcome the effects of depletion of the vitamin B_6 stores prior to mating. The similarity of the response of the animals in the non-depleted group receiving the pyridoxine-free diet to that of the animals receiving the pyridoxine supplements may indicate that either the pyridoxine deficiency was not severe enough to affect liver protein synthesis or that extra-hepatic stores of vitamin B_6 were mobilized to the liver under the stress of pregnancy.

The data indicate that there is a definite influence of vitamin B_6 on liver protein metabolism during pregnancy. This may be due to the influence of vitamin B_6-dependent enzyme systems or to hormonal changes produced by a lack of vitamin B_6. Alterations in the activity of some of the liver enzymes involved in protein metabolism have been reported in vitamin B_6-deficient rats (8, 21).

Indications that hormonal changes occur during a vitamin B_6 deficiency have been reported for both pregnant and non-pregnant animals (22–25). The cessation of the estrous cycle in some of the animals maintained on the depletion diet in this study for as short a period as seven days is further evidence of hormonal disturbance.

Maternal Serum

Depletion of the vitamin B_6 stores prior to mating resulted in average total serum protein concentrations that were significantly lower than those found for the non-depleted animals ($P = 0.01$), but there was little difference within the two main groups (Table 5).

The average values for serum albumin varied little between the groups and were of no statistical significance. However, the albumin values for all the pregnant animals were lower than those found in this study for the depleted animals that could not be bred. It appears, therefore, that serum albumin may be reduced during reproduction in the rat and that albumin synthesis is not impaired by the vitamin B_6 deficiency imposed under the conditions of this study.

Since there were no differences in albumin values, the changes in total protein levels were due to changes in serum globulin. The average globulin content of the serum was significantly lower for all the depleted animals ($P = 0.01$), but there were no significant differences due to the diet during gestation. However, the depleted animals that could not be bred had an average serum globulin value similar to that of the pregnant animals not deprived of pyridoxine either before or during pregnancy. This would appear to indicate that the response of serum globulin to the effects of vitamin B_6 deprivation becomes apparent only during the stress of pregnancy.

The average nonprotein nitrogen content of the serum did not vary to any extent within the non-depleted group or between this group and the depleted animals receiving pyridoxine supplements during gestation, but these values were lower than those reported for non-pregnant rats (26, 27). However, there was a significant reduction in the average concentration of nonprotein nitrogen in the serum of the depleted animals maintained on the pyridoxine-deficient rations during pregnancy ($P = 0.01$).

The changes in serum protein and nonprotein

TABLE 5 **Average protein and nonprotein nitrogen levels of this serum**

PYRIDOXINE SUPPLEMENT	NON-DEPLETED ANIMALS					DEPLETED ANIMALS					
	Number	Total protein	Albumin	Globulin	Nonprotein nitrogen	Number	Total protein	Albumin	Globulin	Nonprotein nitrogen	Days of depletion
mg./100 gm.		*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*mg./100 gm.*		*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*mg./100 gm.*	
0*	8	6.31 ± 0.19†	3.09 ± 0.15	3.31 ± 0.21	34.5 ± 2.5	8	5.80 ± 0.32	3.29 ± 0.17	2.51 ± 0.30	24.4 ± 1.3	12 ± 1
0	10	6.45 + 0.27	3.22 + 0.12‡	3.07 ± 0.20‡	35.3 ± 2.5	8	5.40 ± 0.30	3.22 ± 0.24§	2.12 ± 0.31§	27.3 ± 1.1	14 ± 2
0.4	10	6.15 ± 0.29	3.22 ± 0.12	2.93 ± 0.26	33.8 ± 1.6	8	5.71 ± 0.18	3.02 ± 0.14‖	2.72 ± 0.12‖	31.9 ± 1.7	14 ± 2
0.8	10	6.10 ± 0.23¶	3.11 ± 0.14‡	2.89 ± 0.25¶	34.5 ± 1.4	7	5.85 ± 0.24	3.46 ± 0.12‖	2.51 ± 0.26‖	32.4 ± 1.1	19 ± 3
1.2	10	6.39 ± 0.14	3.56 ± 0.14	2.82 ± 0.23	34.7 ± 2.0	8	5.81 ± 0.15	3.32 ± 0.10	2.50 ± 0.17	30.0 ± 1.6	16 ± 3
0*††	—	—	—	—	—	5	6.65 ± 0.35	3.80 ± 0.23	2.85 ± 0.35	34.6 ± 1.3	52 ± 4

* Plus 0.5 mg. desoxypyridoxine per 100 gm.
† Standard error of the mean.
‡ Average for nine animals.
§ Average for seven animals.
‖ Average for six animals.
¶ Average for 8 animals.
†† These animals could not be bred because of cessation of estrous cycles after eight days on depletion diet.

nitrogen levels observed in the pregnant rat are similar to those reported for the human being. In uncomplicated human pregnancy the total serum protein tends to be slightly lower than in the nonpregnant state. This reduction results from a lowered albumin concentration since the concentration of globulin is increased (28–33). The nonprotein nitrogen level in the serum during human pregnancy running a normal course is lower than that in nonpregnant women (34, 35). The alterations in blood chemistry that have been found in complicated human pregnancies and those occurring in the vitamin B_6-deficient pregnant rats in this study are in many ways similar (32–34). This is not sufficient evidence, however, to justify the assumption that a lack of vitamin B_6 is responsible for complications of human pregnancies, although the administration of pyridoxine has had a beneficial effect in the treatment of some complications of human pregnancy (36–39).

Summary

The effects on reproduction of a vitamin B_6 deficiency instituted at conception and of depleting the maternal vitamin B_6 stores prior to mating were investigated.

The generally accepted gross criteria used in evaluating the adequacy of the diet for successful reproduction were met only by the non-depleted animals maintained on pyridoxine-containing rations during gestation. Maternal weight gains of less than 100 gm., average fetal weight below 5 gm., and increased incidence of resorption were observed in the animals maintained on pyridoxine-deficient diets during gestation or depleted of their vitamin B_6 stores prior to mating.

The percentages of dietary nitrogen retained were lower for all animals in the depleted group than for those on corresponding diets in the non-depleted group. Nitrogen retention was significantly lower on the desoxypyridoxine-supplemented diet in each group. However, the level of pyridoxine in the ration had no significant effect on nitrogen retention within the two main groups.

The data indicate that there is a definite influence of vitamin B_6 on liver protein synthesis during pregnancy. It is suggested that this effect may be due to the influence of vitamin B_6-dependent enzyme systems or to hormonal changes.

Changes in serum protein and non-protein nitrogen concentrations in rats depleted of maternal vitamin B_6 stores prior to mating and/or subjected to pyridoxine deficiency during pregnancy were similar to those reported for complications of human pregnancy.

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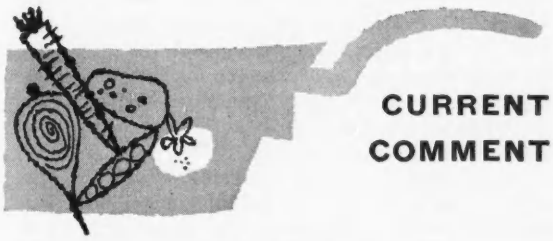
Continuing Education of the Dietitian

To combat the idea that education ends with the acquisition of a college degree, for the last two years—and again in 1956–57—the Education Section of The American Dietetic Association has sponsored a project on the "Continuing Education of the Dietitian."

In Ohio, Eleanor Maclay, University of Cincinnati, reports that of a selected group of members circulated by questionnaire, about half are sponsoring some continuing education work. In most hospitals, the entire staff works together, with the director assuming responsibility for the program. Meetings are usually arranged during on-duty time. About two-thirds are using problem-solving conferences, half have meetings with the medical staff, and half are rotating positions. The methods used most are discussions and reviews of articles and books.

In Detroit, dietitians from several hospitals have met regularly and with excellent results. They feel better able to evaluate their own programs; they see what is being done in other hospitals; and they become acquainted with one another.



CURRENT COMMENT

Weight Control: A Community Program[1]

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Despite the great current interest in weight reduction and the many different types of programs employed, only limited work has been done to learn how well weight loss is retained after the therapeutic period (1–3). Yet, can any weight control program be judged successful unless permanent retention of weight loss is accomplished by the patient?

For some years, the Food and Nutrition Service of the Rochester Chapter, American Red Cross has offered classes in weight control. This weight control program has been one aspect of the total nutritional program and has been considered primarily as a means, rather than an end. The aim of the nutritional program has been the teaching of good nutrition and the change of food habits, and weight loss has been considered primarily a means of motivation.

The present report is an attempt to evaluate this weight control program.

Methodology

At the time of this study, the weight control course offered by the Red Cross in Rochester, New York consisted of ten weekly lessons of 2 hr. each. It was taught by qualified dietitians and nutritionists and had the approval of the Medical Society of the County of Monroe.

Class members were recruited chiefly by publicity in newspapers. At the suggestion of the Medical Society, those who were more than 10 lb. overweight were asked to obtain a doctor's permission to join a class. Usually twenty-five to thirty-five people attended the first class.

Because it was felt that a reducing program should be based on sound nutrition, emphasis was always placed upon good nutrition—not only for the class member, but for her family, too. It was realized that the group influence very likely played its role in the weight loss achieved, and class members themselves commented on the helpfulness of the group. Both in planning and in teaching the course, emphasis was placed on the concept that weight loss could be permanent only if eating habits were changed.

Two staff members and seven volunteers taught the course. Each volunteer teacher received help and suggestions from a staff member. A two-lesson orientation for teaching was given to all teachers.

A definite course outline was used by all the instructors. Course material included a discussion of the Basic 7 food groups and their respective contributions to good nutrition. A meal pattern of approximately 1000 to 1200 calories was presented during the first lesson, with emphasis on the fact that it provided all the foods necessary for health. Other topics discussed at subsequent lessons were: planning good meals for the family which would include foods for the reducer, reasons people overeat, and problems met by the reducer when entertaining or visiting. One lesson was devoted to the caloric content of various foods, but stress was placed on the total meal pattern and the importance of protective foods.

At the first lesson, each woman calculated her "ideal weight." Using body build (as indicated by wrist measurement) and height, ideal weight was figured from tables of the Metropolitan Life Insurance Company (4). The caloric requirement of each person was calculated on the basis of 15 calories per pound of ideal weight (5). The concept of "ideal weight" was discussed by the teacher, and the caloric requirement was defined as "average." This method of figuring ideal weight and calculating caloric requirements, of course, produces only an estimate; however, it worked very satisfactorily in this situation. It was explained that, theoretically, by subtracting 1000 calories a day from one's daily requirement, one should lose 2 lb. a week. The teacher explained, however, that in the present program, no one should eat less than 1000 calories a day; thus, those with an ideal weight of 125 lb. or less would lose less than 2 lb. a week. People were discouraged from losing more than 2 lb. weekly; hence, if they would lose more by eating 1000 to 1200 calories a day, additions to the basic food plan were suggested to keep loss at this figure.

The women were weighed each week, and each plotted her weight on a graph. Generally, the class started with a discussion of why the members had been successful or not in weight loss, and helpful experiences were related. The classes were informal, although naturally the personality of the teacher influenced the atmosphere of her particular class and the response of the participants.

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EVALUATING THE PROGRAM

Evaluation of the program was made in terms of: characterization of the participants; factors which might be related to participation and weight loss; for those who completed the course, maintenance of weight loss after classes were concluded; and their nutritional knowledge.

Records of all women who registered for classes between September 1952 and August 1953 were used as a source of data in regard to: initial weight, amount of overweight, classes attended, and weight loss.

Success in retaining weight loss was checked by interviewing participants approximately one to two years after they had first registered for a class. This group numbered 139 women and included those who had attended nine or more lessons, regardless of whether the classes were taken in the first course or in a series of courses. Of this group, 112 had completed nine or ten lessons in the first course for which they had registered. The remaining 27 had attended less than nine lessons in the first course, then re-registered. It should also be pointed out that of the 112 who finished the course, 36 re-registered for another course. Thus, of the total group, 76 registered for and attended only one set of lessons, while 63 participated in more than one set of lessons. Each woman in the group was sent a letter explaining the purpose of the study and asking for her cooperation.

It was possible to contact, weigh, and interview 108 women (77 per cent) of the total group of 139 women. Of the 31 not contacted, 5 had moved from the city, 4 had illness in the family, 1 was pregnant, 3 were on vacation, and 18 were "too busy." Of the 112 women who finished nine or ten lessons in the first course for which they registered, 89 (80 per cent) were interviewed.

In the fall of 1953, the School of Nutrition at Cornell University had made a survey of the food and nutritional knowledge of Rochester homemakers (6), which will be referred to subsequently as the "Rochester Homemaker's Survey." The questions about nutrition which were asked in the present study were taken from the questionnaire used in the Rochester survey, so that a comparison could be made of the nutritional knowledge of women from the Red Cross follow-up group and that of the Rochester Homemaker's Survey group of similar level of educational attainment.

Results

Of the 549 women who registered for the course from September 1952 through August 1953, 54 per cent took five or less lessons, while 20 per cent finished nine or ten lessons. Only 9.5 per cent of those who started attended all ten lessons in their first course. However, some attended lessons irregularly, so that 137 women (25 per cent) attended the tenth lesson and 199 women (36 per cent) attended the ninth lesson. Even though circumstances prevented or motivation was not great enough to make the latter groups attend every lesson, interest was sustained sufficiently to keep them for part of the program until the course ended.

Initial weights ranged from 107 to 270 lb., the average being 163¼ lb. and the median 160 lb. For the 481 women for whom we have ideal weights, the range was from 105 to 175 lb., with a mean of 134¾ lb. and a median of 134 lb. For these 481 women, the overweight ranged from 1 to 125 lb., with an average of 29 lb. and a median of 24 It is interesting to note that 43 per cent were 20 lb. or less overweight, while 78 per cent were 40 lb. or less overweight.

When overweight was expressed as percentage of excess weight, the range was from 1 to 86 per cent, with a mean of 22 per cent and a median of 18 per cent. Only 20 per cent of the women were more than 30 per cent overweight, and 43 per cent were 15 per cent or less overweight.

FACTORS IN CONTINUED PARTICIPATION IN COURSE

We were interested in whether, from the data available, we could identify factors related to the number of lessons which each person completed, i.e., her continuance in the course. In connection with this point we examined the data on the women who dropped out at various stages of the course with respect to: ideal weight, initial weight, per cent excess weight, and pounds excess weight. From these data it was learned that the group attending nine or ten classes had a slightly higher initial excess weight than most of the women taking fewer lessons. In all other respects, the groups were remarkably similar.

We also wanted to see whether the instructor, the time of day, or the time of year when the course was given would have an influence on the number of people completing the course. The only factor which seemed important was the time of day. Evening classes had a smaller percentage of the participants finishing the course.

Of the total of 549 women who registered during the year, 70 (13 per cent) re-registered for another course; 36 of these had finished nine or ten lessons in the first course. However, few who re-registered attended the second set of lessons consistently.

Another factor which might influence continued attendance might be the weight loss achieved as the classes progressed. Were those who continued attending those who were making more satisfactory progress than those who dropped out? To examine this point, the women were classified according to the number of lessons attended. For each group at each lesson, the cumulative weight loss for the entire group was totaled and divided by the number in the group to obtain the average weight loss of a constant

TABLE 1 Weight losses related to sustained participation in course

LESSONS COMPLETED	NUMBER OF WOMEN	CUMULATIVE WEIGHT LOSS								
		1 week	2 weeks	3 weeks	4 weeks	5 weeks	6 weeks	7 weeks	8 weeks	9 weeks
		lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
10	52	2¾	4½	5¾	7¼	8¼	9¼	10½	11	12
9	60	3	4½	5¾	7	7½	8½	9½	10¼	
8	56	3	4½	5½	6¼	7	7¾	8½		
7	48	2¼	3½	4½	5½	6	7			
6	37	2¼	3¾	5	5	6				
5	40	2¼	3½	4½	5					
4	51	2	2¾	3						
3	63	2	2¾							
2	62	1¼								

group of women over a given period of weeks. By this means we compared the cumulative average losses of different groups at each week of therapy (Table 1). For the fifty-two women attending ten lessons, the cumulative average loss at the end of four weeks was 7¼ lb., while for the forty women taking only five lessons, the cumulative average loss at the end of four weeks was only 5 lb. From the beginning of therapy, at each class, those people who eventually continued to nine or ten lessons had a cumulative average weight loss greater than those who took fewer lessons.

About 20 per cent of the 112 women who finished nine or ten lessons in their first course lost more than 15 lb.; only 15 per cent lost 5 lb. or less. Thirty-three per cent lost more than 50 per cent of their excess weight; only 8 per cent lost 10 per cent or less of excess weight.

THE "FOLLOW-UP" GROUP

Of the 139 women who completed nine or more lessons, 108 were successfully contacted, weighed, and interviewed in the follow-up study. Since we questioned whether these women were representative of the entire group of 139, course records on the interviewed group and the group not interviewed were compared in regard to: initial weight, ideal weight, initial pounds excess weight, pounds lost, and per cent excess weight lost. During the course the follow-up subjects had lost slightly more weight and a somewhat greater percentage of their excess weight than those who were not followed up. One wonders how many of the eighteen women who refused to be interviewed had regained weight after classes were concluded.

Of the 108 women interviewed, 21 had finished a class less than a year before, while 87 were interviewed from thirteen to twenty-one months after their last class. The median number of months since completion of classes was 16.5. All of these women had attended their first course at least twelve months before the follow-up study.

TABLE 2 Weight change from last lesson to follow-up

WEIGHT CHANGE	NUMBER OF WOMEN			PERCENTAGE OF WOMEN
	Less than 12 months	13 to 21 months	Total	
Weight Loss				
31—40 lb.	—	1	1	0.9
21—30 lb.	—	0	0	0
11—20 lb.	—	1	1	0.9
4—10 lb.	4	6	10	9.3
1—3 lb.	3	12	15	14.0
No Change in Weight				
0	0	2	2	1.9
Gain in Weight*				
1— 3 lb.	1	15	16	15.0
4—10 lb.	7	30	37	34.6
11—20 lb.	4	17	21	19.7
21—30 lb.	2	2	4	3.7

* One woman refused to be weighed. She is known to have gained over 10 lb.

Weight Loss: Success of the women in the follow-up group with regard to weight loss might be judged in two ways. What was their success in maintaining the weight loss during classes as measured by weight change between the last lesson and the follow-up interview? Or, what was the net weight change achieved between the beginning of the course and follow up?

At the time of follow up, 25 per cent had lost weight since the last lesson; the weight of 2 per cent remained unchanged; and 73 per cent had gained. The weight losses ranged from 1 to 36 lb. with an average of 5.25 and a median of 3.0 lb. Gains ranged from 1 to 26 lb. with a mean of 9.25 and a median of 7.0 lb. Of the group followed up in less than twelve months, 33 per cent had continued to lose and 67 per cent had gained; but, of the group for whom the follow up occurred thirteen to twenty-one months after completion of lessons, 23 per cent had continued to lose, 75 per cent had gained, and 2 per cent remained unchanged. Actually, both the median gain and loss were less at the thirteen to twenty-one-month interval than for the group at the shorter time follow up. Table 2 gives the actual distribution of the weight changes after the last lesson until the follow up. If, however, from a practical standpoint, a weight change ranging up to 3 lb. is defined as "no change," 31 per cent of the women would have maintained their weight, only about 11 per cent would be considered to have continued to lose weight and 58 per cent to have gained weight.

The over-all effect of the course in terms of weight reduction for the 108 women can be judged by the net weight change from the first lesson to the follow

TABLE 3 Weight change from first lesson to follow-up

WEIGHT CHANGE	NUMBER OF WOMEN			PERCENTAGE OF WOMEN
	Less than 12 months	13 to 21 months	Total	
Weight Loss				
41 lb. and over	—	1	1	0.9
31—40 lb.	1	2	3	2.8
21—30 lb.	3	4	7	6.5
11—20 lb.	5	18	23	21.5
4—10 lb.	5	35	40	37.4
1—3 lb.	2	9	11	10.3
No change in Weight				
0	—	1	1	0.9
Gain in Weight				
1—3 lb.	—	8	8	7.5
4—10 lb.	3	5	8	7.5
11—17 lb.	2	3	5	4.7

* One woman refused to be weighed; she is known to have gained over 10 lb.

up. From the first lesson until the follow up a year or more later, 79 per cent had lost weight, 20 per cent had gained weight, and 1 per cent had remained unchanged. Weight losses ranged from 1 to 43 lb., the mean loss being 11.25, the median 8.0 lb. Gains ranged from 1 to 17 lb., the mean being 6.75 lb., the median, 4 lb. Thus, even though 73 of the 108 women gained weight after finishing the course, only 20 per cent showed a gain over their initial weight. The distribution of weight changes from the first lesson until the follow up is given in Table 3. Again, if for practical purposes, we define "no change" as a change of 3 lb. or less, about 18 per cent of the women showed no change from the first lesson to the follow up; only 13 per cent showed a gain of from 4 to 17 lb., and 69 per cent showed a loss of 4 to over 41 lb.

NUTRITIONAL KNOWLEDGE

Since one purpose of the weight control classes was to teach the fundamentals of nutrition as a basis for possible change in food habits, it was desired to compare the nutritional knowledge of the group of women who had completed nine or more lessons with the knowledge of a representative group of homemakers of similar educational background who had participated in the Rochester Homemaker's Survey.

The questions asked the Red Cross group were based on the questionnaire used in the Rochester Homemaker's Survey. However, the question "What do you feel should be included in the meals for your family each day?" was reworded to "What do you think everyone should eat every day to keep healthy?" For each food mentioned, the question was then asked, "Why should you eat that?" The answers were then classified as to whether each of the Basic 7 food groups was or was not mentioned, and whether the reason for eating it was correct or incorrect.

TABLE 4 Nutritional knowledge possessed by Red Cross follow-up and Rochester Homemaker's Survey groups

FOOD GROUP	PERCENTAGE OF WOMEN					
	8th grade education or less		Some high school education		High school graduate	
	Red Cross (15 women)	Homemaker Survey (109 women)	Red Cross (25 women)	Homemaker Survey (38 women)	Red Cross (67 women)	Homemaker Survey (118 women)
Demonstrated Knowledge of Basic 7 Food Groups						
Meat, fish, poultry	87	21	68	36	90	49
Milk, cheese, ice cream	93	17	72	31	88	43
Potatoes, other fruits and vegetables	40	23	80	34	75	45
Bread, flour, cereals	27	10	48	13	48	23
Leafy, green or yellow vegetables	20	4	28	6	43	10
Butter or fortified margarine	13	2	16	3	33	6
Citrus fruit—tomatoes or cabbage	20	2	16	3	27	4
Demonstrated Knowledge of Nutritionally Comparable Substitutes						
Milk	47	26	48	36	54	46
Citrus fruit	20	15	60	27	54	44

A general assessment of nutritional knowledge was made on the basis of the number of essential food groups which the homemaker mentioned and for which she knew a correct reason for eating. If three or more food groups and correct reasons were given, knowledge was assessed as "minimal." The women were also asked what foods could be substituted for milk and for oranges and grapefruit.

When the data from the Rochester Homemaker's Survey were analyzed, the most important factor related to the homemaker's nutritional knowledge was her level of formal educational attainment. Hence, comparisons of nutritional knowledge of the Red Cross follow-up group and the Rochester Homemaker's Survey group were made between groups of women of similar educational attainment.

Table 4 gives the percentage of women at each educational level from the Red Cross group and the Rochester Homemaker's Survey group who named each food group to be included each day and gave a correct reason for its importance as a daily food. It also provides a similar comparison of the percentage from each group naming correct substitutes for milk

TABLE 5 Comparison of Red Cross and Rochester Homemaker's Survey groups in regard to percentage of group having "minimal" knowledge of nutrition

EDUCATIONAL LEVEL	RED CROSS FOLLOW-UP GROUP	ROCHESTER HOMEMAKER'S SURVEY GROUP
8th grade or less	53	10
Some high school	76	19
High school graduate	82	28
All levels.....	76.6	19.4

and for citrus fruit. In Table 5 are given the percentages of women at each educational level in each group who had a "minimal" knowledge of nutrition. At each educational level, a higher percentage of the Red Cross group had correct nutritional knowledge than did the Rochester Homemaker's Survey group. This was true by any of the methods used to assess nutritional knowledge.

Discussion

Only 20 per cent of the women registered for the Red Cross course were more than 30 per cent overweight. This is much lower than that reported for patients undergoing therapy in clinics or private practice. Bauman reports (7) an average of 54 lb. overweight for clinic patients. Another report of a clinic program by Gray and Kallenbach (8) states that the average percentage of overweight was 46 per cent, with almost 65 per cent of the patients more than 30 per cent overweight. Young, reporting (9) on an experimental obesity clinic, has stated that 60 per cent of the women participating were 30 per cent or more overweight. On the other hand, in a community program reported by Gutsch (10), the distribution of the degree of overweight was somewhat similar to the Red Cross program's distribution—37 per cent of the participants were more than 30 per cent overweight. It would seem that such a community weight control program reaches people not generally reached in the ordinary therapeutic situation.

DEGREE OF PARTICIPATION

In the Red Cross program, only 9.5 per cent of the women attended all ten lessons of the course, about 50 per cent completed less than five lessons, and 15 per cent did not return for a second lesson.

We have few figures on those people who do not accept therapy. Trulson states (11) that about 31 per cent of the patients reached in an obesity clinic did not return after the first visit. Of the clinic patients studied by Gray and Kallenbach (8), 32 per cent quit within one month or were uncooperative in keeping appointments. Gutsch reports (10) that 15 per cent of those attending the first meeting of a weight control program did not return for the second meeting. An unusual degree of participation is reported by Young (9) for the patients in an experimental obesity clinic—only 17 per cent dropped out before ten weeks of therapy, and only 7 per cent after four weeks.

It would appear that many people who need and want to lose weight, in some way cannot accept a reducing regimen. Little is known about why people drop out of a reducing program. In this study, we have not answered that question from the data available. It did seem that those who completed the course were slightly heavier in weight than those who did not. Fewer women who registered for evening classes completed the course, and it is likely that these women had less free time than those in the daytime classes.

The biggest problem in such a program, it would seem, is the large number of people who do not complete the entire program—since those who do continue are successful. It may be that those who dropped out early did so because they had learned all they needed to know to be able to continue to lose weight, while those who continued may have needed the help of the group. We do not know how much those people who attended only a few classes were helped in terms of continued weight loss or in terms of nutritional knowledge. We need to know what happened a year afterward to these people. They might show a pattern of weight maintenance and knowledge of nutrition similar to those who finished the course. The findings of this study suggest the advisability of follow-up study, both in regard to weight loss and nutritional knowledge, not only of the people who participated completely in the program, but also of those who dropped out in the earlier stages of the course. Such an appraisal would tell us whether the program benefited in like manner the greater majority of those who participated to a lesser extent. In any event, in a program in which such a large percentage of people do not return for continued help, the important subject matter should be included in the early lessons of the course.

WEIGHT LOSS

Apparently motivation is expressed both in terms of participation and weight loss, since those who completed the course showed a good weight loss. A fairer and more realistic measure of success of a weight control program is weight change over a fairly long time. A year to two years after registering for the Red Cross course, 79 per cent of the women completing the course showed a loss of at least some weight. Thus, it seems that, in general, if the participants continue to the end of the program, a high proportion will be helped to lose weight in what appears to be a lasting fashion.

Summary

A Red Cross weight control program, which consisted of a series of ten lessons and the objective of

which was not only production of weight loss but also the teaching of good nutrition, is described.

The program was evaluated by: degree of participation of the 549 women registered for classes, weight loss during the course, retention of weight loss by those finishing nine or more lessons after one to two years had elapsed since registration for class, and nutritional knowledge of those finishing nine or more lessons.

Of the women who registered, 9.5 per cent attended all ten lessons; only 20 per cent completed nine or ten lessons; about 50 per cent completed less than five lessons; and 13 per cent registered again for another series of lessons.

Motivation seemed to be expressed both by weight loss and by participation. Those who attended more lessons lost more weight, even in the beginning period of therapy, as compared to those who attended fewer lessons.

The instructor or the time of year did not appear to influence degree of participation, although fewer women registering for evening classes finished the course.

One hundred and eight women who completed nine or ten lessons were weighed one to two years after registration. Of these, only 28 per cent had not regained at least some of the weight lost, although 79 per cent weighed less than when they had started the course.

In addition, these women were asked questions to discover what they knew about the foods which should be included in meals for their families. Replies were compared with answers obtained in a previous survey of homemakers in the same city. It was found that the Red Cross group had a greater knowledge of nutrition.

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Teaching the Patient Means *Reaching* the Patient

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At an early morning conference at the 38th annual meeting of the Association in St. Louis, some hundred and fifty dietitians informally considered the question of "Teaching the Patient." The conference was led by this reporter, supported by a panel consisting of: Betsy Helburn, Chief Nutritionist, Nutrition Clinic, International Ladies Garment Workers Union Health Center, New York City; Ruth E. Franklin, Consulting Dietitian, Mayo Clinic, Rochester, Minnesota; and Ann Molleson, Assistant Professor of Nutrition, School of Nursing, University of North Carolina, Chapel Hill. The following material summarizes some of the points made during a lively discussion among the conferees.

In order to *teach* the patient one must first *reach* the patient. Hence much of the discussion was directed toward means of reaching the patient. Discussion centered around developing four principal topics: the patient and his needs; the therapist—choosing the right professional personnel to work with the patient; techniques—the patient-centered approach; and patient-centered materials.

The Patient—His Needs

What is the patient like when he comes to you? What needs and attitudes of patients must we be aware of when they come to us for instruction? Such an understanding is basic to reaching the patient and hence to teaching him. Some of the basic attitudes and needs encountered in patients include: fear, expressed as anxiety, insecurity, or various means used of covering up fear; the need to protect or preserve his self-respect, often expressed as a need to defy authority; and the need for dependency and love.

The expressions of fear or anxiety by patients in

the clinic are many and diverse. They include impatience with clinic routine, restlessness and physical uneasiness, self-consciousness, extreme talkativeness or extreme reticence, the "know-it-all attitude" and contemptuousness, and depression and discouragement with the "what's-the-use" attitude. Unwillingness to change pattern of diet or of living, either by statement or by act, often represents fear of leaving the secure, the known, or the accepted. This may actually be a sound reason for our not changing the patient's routine any more than absolutely necessary. Apparent indifference by the patient is often basically a defense measure to cover up fear or to preserve self-respect. In such a case, the therapist often accomplishes most by ignoring the indifference and proceeding with instruction with even more care, interest, and reassurance than if the patient appeared vitally interested. Fear is also seen in apprehensiveness on the part of the patient: "What is this all going to involve?" Because of the basic fear and anxiety present in patients, scare and threat tactics should be avoided.

The patient's need to preserve his self-respect is often seen as hostility toward his family, his friends, or even the doctor. Anger and irritability may be directed against the therapist or anyone else in the clinic. Often the anger is best ignored, or, in some cases, it is helpful to encourage the patient to talk about the reasons for his anger. Frequently patients show a need to establish their prestige and position with the therapist. Sometimes a "superior" attitude is the result of fear of the loss of status, prestige, social acceptance, or the feeling of personal failure and inadequacy by the patient. Such a reaction is also associated with the need for self-respect which is threatened. Defiance and aggressiveness toward those who try to tell the patient what to do may represent his need to maintain his own integrity or an immature need to defy authority. Resentment, rebellion against restriction, shame at failure in self, apologetic attitude over failure to follow instructions—all are associated with need for maintaining self-respect. At the other extreme is the patient's great exhilaration over any accomplishments he achieves, which comes from his increased self-respect.

The patient's need for dependency is manifested in many ways: his enjoyment in coming to the clinic, his desire to come more often, his faithfulness in keeping appointments, the various means he uses in bidding for the therapist's attention, his desire for special attention and instruction, his gratitude toward the therapist expressed in many ways and his relief of symptoms.

We need, then, to be aware of the various needs and attitudes of the patient and to consider each patient as an individual, and to know what such attitudes mean if we are to be more understanding in dealing with the patient.

The Therapist

Perhaps the biggest single factor in meeting the needs of the patient (and hence in reaching the patient in order to teach him) is the choice of the right therapist. Not all well trained dietitians are suited to clinic work.

What are some of the characteristics of a good therapist? The first quality listed was a basic sincere love of people—all kinds of people,—expressed by a respect for the individual, his self-respect and self-integrity. Also, mentioned as basic was empathy—the ability to project one's self into the role of the patient without over-identification and a sensitivity to his needs. Also stressed was the ability to put the patient at ease by willingness to listen; by a warm friendly attitude, by absolute sincerity and honesty, and by a patient and unhurried, unjudging attitude and relaxed manner. Flexibility, insight, and practicality were also thought to be of prime importance.

In addition, the therapist should be capable of building mutual respect and confidence with the other members of the medical team. Her ability to produce results with patients will, of course, serve as a basis for medical respect. She should also show willingness and ability to carry responsibility under authority and to rise to demands of the doctor at the time of the demand. She should have a true understanding of medical ethics.

Techniques—Patient-Centered Approach

There are no uniform or standard procedures which should or could be laid down as applicable to all patients or in the hands of all therapists. The method or technique used should be adjusted to the needs of the individual patient at the moment the instruction is being given and to the skills of the particular therapist.

What are some points to be remembered in developing methods for clinic use? The method used should be patient centered, adjusted to his needs at that moment. To accomplish this, the therapist must know all she can about the patient—from his record, from the other therapists concerned with his care, and from learning his story first hand by getting the patient to talk and then by reading "between the lines." Much of the therapy time may be spent on getting the story, finding the needs of the patient, and in building a climate in which he is relaxed and at ease. Once such a relationship is established with the patient, actual instruction may take relatively little time. The support given and general nutritional education may be as important as the individual dietary instruction. It is important to be accurate and to help the patient understand the "whys" of any limitations—not simply "No," but "No, because. . ."

The importance of two kinds of clinic notes was discussed; those for the patient's clinic record which

represent your contribution as a team member, and those for the dietitian's personal file which may be important in continued rapport with the patient.

Materials—Patient Centered

Materials must be suitable to meet the needs of the individual patient at the time of instruction. What are some of the characteristics of good materials for patient instruction? Among the characteristics of materials mentioned as desirable were: brevity, simplicity of language, accuracy and factualness, logical sequence for instruction, and graphic presentation. It was suggested that in some ways instruction sheets are like an exhibit in which not too many points should be covered on one section. The importance of factors in the layout of instructions, such as the quality and color of paper, ink, type size, and format, was illustrated with sample instructions by members of the panel.

Summary

To *teach* the patient, we must *reach* him. To reach the patient, one must understand his needs and be able to rightly interpret his attitudes. The patient must be considered as an individual and in relation to the factors which may be influencing his ability to understand and to follow the diet recommended.

The choice of the right kind of a therapist is perhaps one of the biggest factors in reaching the patient. The method to be used in reaching the patient must be adjusted to the needs of the individual patient at the moment of instruction and to the skills of the therapist. There is no standard procedure which can be laid down as applicable to all patients in the hands of all therapists.

The materials as well as the methods to be used in instruction, should be patient centered. Materials should be brief, simple, accurate, factual, and capable of adaptation to the individual being instructed.

Food Outlook

Food supplies for 1957 will change only in special areas, according to the Agricultural Marketing Service of the U.S.D.A. In *The National Food Situation*, released in November, the prediction is made that food supplies will be large, though probably a little below the year-earlier level. Food prices in the first four or five months of 1957 are expected to continue somewhat higher than a year ago.

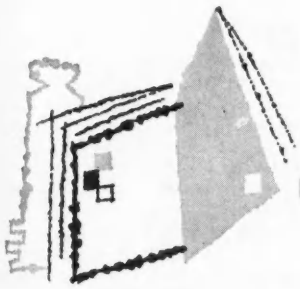
During the late fall and winter of 1956–57, we probably will have a little less meat per person, and meat prices will continue somewhat higher than the low ones a year ago. Because of the low prices received by farmers in late 1955 and early 1956, about 8 per cent fewer hogs were raised in 1956, and the number of cattle fed to heavy weight was reduced. However, cattle slaughter will be at least as large this fall and winter as last. Declines in consumption rate from last fall and winter are also indicated for lard, sweet potatoes, dry beans, apples, and grapes. However, increases are in prospect for eggs, chicken and turkey, processed fishery products, fresh citrus fruits, frozen orange juice, fresh and processed vegetables, and potatoes. Consumers will have at least as much of the dairy products per person as last fall and winter.

With large stocks and average growing weather, supplies of most foods are expected to continue large throughout 1957. The level of prices for meat animals this fall and winter may encourage farmers gradually to increase hog production, thus regaining the 1956 slaughter rate by late in the year, and to feed as many or more cattle in 1957 as in 1956. Milk production is expected to be up some in 1957, because of a continued increase in output per cow. Production of eggs and poultry meat will continue high.

Compared with 1956, some small shifts in the pattern of food consumption are indicated. We may expect civilians to consume a little larger quantity per person of chicken meat, fresh oranges and tangerines, frozen concentrated orange juice, and processed vegetables in 1957 than in 1956. Small reductions are likely for meat, but nevertheless, the annual consumption rate next year is expected to average higher than in any year from 1909 to 1954.

Food exports may be about the same in 1957 as in 1956. Exports of rice and dry peas may be much larger but less butter and dry beans may go out.

Current prospects point to world output of major foods in 1956–57 about the same or slightly larger than in 1955–56, which was a good year. Crop conditions were generally favorable in most parts of the world except in Europe and Australia. Output of livestock products, particularly dairy products, will show a further small increase in 1957. Economic activity continues at high levels in all parts of the world and per capita consumption of food is likely to show a further slight increase in most areas. With increasing consumer incomes, the quantity of food consumed is rising in those areas of the world having generally low levels. There is also a widespread shift to foods of higher quality.



BOOK REVIEWS

Body Measurements and Human Nutrition. Edited by Josef Brožek. Detroit: Wayne University Press, 1956. Cloth. Pp. 163. Price $3.50.

This book is an ably edited compilation of papers presented by eminent specialists at the Conference on the Role of Body Measurements in the Evaluation of Human Nutrition. The conference was sponsored by the Committee on Nutritional Anthropometry, Food and Nutrition Board, National Research Council and held at Harvard University, June 17 and 18, 1955. The committee was established in May 1951 in recognition of a major neglected area in human nutrition, namely, the evaluation of nutritional status of man with regard to emaciation, obesity, growth, and skeletal and muscular development. The editor, Dr. Josef Brožek, has had extensive experience in the use of body measurements to assess the state of nutrition under the conditions mentioned.

"Nutritional anthropometry," the area treated in this book, is the application of body measurements for the purpose of characterizing man's nutritional status in terms of body composition. Such knowledge is useful in "evaluation of caloric requirements, assessment of nutriture of a given school child or patient, description of the present nutritional status of different populations and the demonstration of improvement resulting from better economic, agricultural or dietary practices, and a continuous assessment of the biological adequacy of the caloric supply during periods of food restriction and food shortages."

The following topics were discussed: "Physique and Nutritional Status of Adult Men" by Dr. Brožek; "Body Build and Body Weight in 25-Year-Old Army Men" by R. M. White; "Variable Factors in Skeleton Weight" by M. Trotter; "Skinfold Measurements in Young American Males" by Russell M. Newman; "Correlations Between Thickness of Skinfolds and Body Density in 88 Soldiers" by L. R. Pascale, M. I. Grossman, H. S. Sloane, and T. Frankel; "The Canadian Weight-Height Survey" by L. B. Pett and G. F. Ogilvie; "Anthropometry and Nutritional Status of Adult Women" by M. A. Ohlson, A. Biester, W. D. Brewer, B. E. Hawthorne, and M. B. Hutchinson; "Obesity and Disease" by A. B. Kurlander, S. Abraham, and J. W. Rion; "Body Weight: Facts from Life Insurance Records" by H. H. Marks; "Fat Thickness and Growth Progress During Infancy" by S. M. Garn; "Allometric Growth of Body Composition in Man and Other Mammals" by E. E. Hunt, Jr. and E. Giles.

As an outcome of the meeting, the Committee formulated recommendations concerning body measurements for characterizing nutritional status. These recommendations are presented. Nutritional status studies of the future will undoubtedly be strengthened by the efforts of the conference and the work of the committee.

The recommendations relate to sampling, to selection of measurements to be used, to methods for making the body measurements and for recording and reporting data. The minimum measurements needed for adults and children are described. The selection is based on the measurements needed (a) to arrive at a relative weight of an individual, obtained as a ratio of the actual to the "standard" weight and (b) to appraise the relative fat content of the individual.

The reader is impressed with the importance of obtaining a measurement of the fat content of the individual, and with the research which has been done on this method, particularly as it applies to men. Since a large amount of adipose tissue is located under the skin, leanness-fatness of the individual may be measured by the thickness of these folds. Thickness of skinfolds is considered by Brožek to be a "simpler and more direct measure of leanness-fatness than standard (reference) weight."

For comparative purposes, carefully standardized conditions must be followed. Techniques for use with women and children are less well standardized than with men. The site of choice for older girls and women differs from that of men. The importance of some knowledge of the fat stores in any assessment of nutrition is highlighted in this work, although the optimal size of the fat stores at different age levels is not precisely known.

The significance of fat stores at the different age levels, as herein discussed, is intriguing. For example, there was little evidence in the post-natal observations of three hundred white infants by Garn and his associates that the fatter infants were consistently more robust or faster growing. Therefore, during the first year of life, the use of subcutaneous fat as a measure of nutritional status in healthy infants may be questioned. Attention is also called to the fact that during adolescence in the female, the amount of subcutaneous fat is greatly increased. In this case hormones serve to direct the mobilization and deposition of fat. Garn states that, in general, the amount of fat is related to size and growth progress and therefore to nutritional status, but that seemingly in the transitional periods, fat appears to be a less useful measure of nutrition because at such times the deposit depends on the maturity attained.

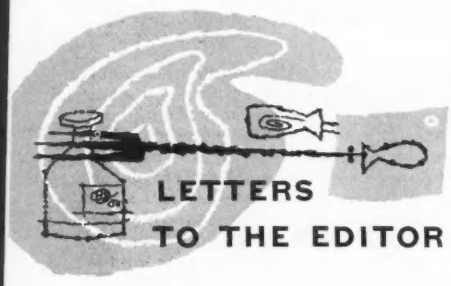
Muscular tissue may be characterized by techniques described, but little work has been done regarding measurements of this portion of the body mass. Efforts have been made to develop formulas for estimating the weight of the bones, which contribute approximately 16 per cent of the body mass. In the skeletal system, attention is directed to the ratio of the organic and inorganic components, which is usually constant among the individual bones. However, in some skeletons the inorganic constituents may be reduced, first in the bones which are largely cancellous and later in the more compact long limb bones. The disturbance in equilibrium is not uniform among the individual bones, but rather is a progressive change initiated in one region and extending to other regions in an orderly sequence.

The ultimate goal of "nutritional anthropometry" is apparently to discover ways and means of determining body composition in such terms as fat, skeleton, water, and musculature, and to have suitable standards for comparison of people of both sexes and all ages. Progress to date relates chiefly to men.

Body measurements have long been used, with varying degrees of discrimination, to assess the nutrition of individuals. A study of this book can increase the precision by which these methods are employed and the understanding by which the results are interpreted. The book points up clearly the contribution of yet another field, anthropometry, to the complex subject of nutrition and the need for including it in the disciplines with which the nutritionist should be familiar.—*Ercel S. Eppright, Ph.D., Head, Department of Food and Nutrition, Iowa State College, Ames.*

RECENT BOOK RECEIVED

Proceedings, First International Conference on the Use of Antibiotics in Agriculture. Publication 397. Washington: National Academy of Sciences—National Research Council, 1956. Cloth. Pp. 278. Price $2.50.



Sound Nutrition Information for the Lay Public

To the Editor:

Members of the dietetic profession are always grateful when magazines with wide distribution seek to present factual information relating to food and nutrition. Such is the case in the article, "Why Fad Diets Fail" in the November 1956 issue of *McCall's* Magazine.

I do have one concern, however, about the information published in this feature, in the section on "McCall's Diet You Can Live By." In my experience, I have observed that many persons who concern themselves primarily with the number of calories are apt to choose foods in rather strange and unusual ways. Consequently, I hope that *McCall's* will continue to serve the public by presenting further information to help the reader choose a diet that is adequate, although restricted in calories.

Again, I feel that congratulations are due that magazine for taking a sane stand in the direction of a sensible approach to the problem of obesity.—*Adelia M. Beeuwkes, Associate Professor of Public Health Nutrition, University of Michigan, School of Public Health, Ann Arbor.*

High-Sodium Vegetables

To the Editor

The October issue of the Journal contains an excellent article on "Supplements to Diabetic Diet Material" by Elizabeth K. Caso. However, there is one item included in the low-sodium exchange list which I don't quite understand, namely, that in Vegetable B, carrots, beets, and turnips are excluded. I can understand why beets would not be desired, due to their high-sodium content, but when I check the sodium content of carrots and turnips in *Nutritional Data* (published by H. J. Heinz Company, Pittsburgh), the figures did not appear to be exceptionally high.

Are there other reasons why these two vegetables are to be omitted?—*Florene Meiers, Dietitian, Zieger Osteopathic Hospital, Detroit.*

Editor's Note: The exclusion of carrots, beets, and turnips under Vegetable B group was done on the basis of figures published in the National Research Council's Bulletin No. 325, "Sodium Restricted Diets." Carrots are listed at 51 to 95 mg. sodium per 100 gm.; beets ranged from 28 to 66 mg.; and turnips ranged from 37 to 58 mg. "Best" values are suggested in this publication as 50 mg. for carrots, 60 mg. for beets, and 40 mg. for white turnips. These figures are all higher than we had assumed from the figures reported by Bills (J. Am. Dietet. A. 25: 304, 1949) which were used in compiling the figures in *Nutritional Data.*

State Associations' Opportunities at Annual Meetings

To the Editor

I wish that more states had taken advantage of the opportunity offered to interpret states' activities by exhibiting at the House of Delegates and State Officers' meeting at the Annual Meeting of the A.D.A. in Milwaukee. Perhaps next year more will heed the admonition we were given so frequently at convention to be more vocal. I hope I am right in assuming we'll have another opportunity. It's a chance for us not only to interpret to others what we do, but for the members of the state association exhibiting to take account for themselves. I still wonder why more states didn't exhibit. Isn't this something for public relations committees to ponder?—*A. June Bricker, President, New York State Dietetic Association.*

A Letter from Iran

To the Editor:

A former Shirazi, Mohannad Nemazee, contributed the funds to build the Shiraz Medical Center to help improve the health of his fellow Iranians. The hospital of the Medical Center opened ten days after I arrived in the spring of 1955. The Medical Center itself is very modern and is set up on American standards. We have student nurses, interns, student laboratory technicians and I hope, sometime in the future, dietetic interns. Each department is staffed by an American and as personnel becomes available, we will work with Iranian counterparts so that eventually they can take over the operation of the hospital. The Center almost outranks Persepolis as a tourist attraction in the Shiraz area because of the beautiful grounds and modern equipment.

Life in Iran is both fascinating and frustrating. It is amazing how quickly the unfamiliar becomes the familiar part of everyday living. The first time I ordered chickens, I discovered that they were delivered alive. It has been a long struggle, but I no longer find them lying on the kitchen floor. The excitement starts when the string tying their legs together comes undone, and the boys must chase chickens all over the delivery area. Salt, tomatoes, sugar, and other items may arrive at the delivery area on a heavily laden burro or occasionally in a droshky. Other items are brought by taxi or in the hospital carry-all.

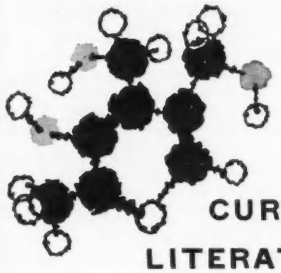
My cooks at first spoke no English, and I spoke no Farsi. Sign language is most effective when there is no alternative, but we all learned fast. I no longer find the cooks squatting on the floor to prepare food, as I did at first. Perhaps I should add—at least not when I'm in the kitchen. I'm sure they revert to their old habits when I'm not around.

The biggest problem was learning Persian dishes and at which meals they could be served. I haven't the courage to reread my first menus, for I know now that they weren't always acceptable. Menu planning is still a struggle. Although I'm at home with *koresh, kebab,* and *polo,* certain food combinations must be avoided. Foods are classed as cold or warm, and the classification has nothing to do with the temperature of the food. As an example, watermelon is cold and grapes are warm. Certain foods must be avoided if a person has a cold or fever.

Although our patient load is small, I often have more than 50 per cent on modified diets. By trial and error, I am learning which foods can be used on various therapeutic diets. In fact, my current project is the preparation of a diet manual. Since rice is a staple for those who can afford it, I'm fortunate in that it can be used for most modified diets. The low-sodium diet was not successful at first, and it was only after a long time that I discovered the cooks were soaking the rice in salt, the usual procedure here. They washed it off, since they knew they were to prepare it without salt. It required considerable explaining to convince them they could not wash the salt out. The diabetic exchange lists have been most helpful and can be modified easily to use the foods available. The discharge diet, however, would look strange in the U. S. Measuring cups and spoons are non-existent, so servings must be stated by the size of teacup and spoons used in the homes.

I am especially fond of the *lavash* and *mast. Lavash,* which is a form of bread, is made from freshly ground wheat which is shaped into thin long oblong sheets and baked on the sides of a dome-shaped oven. Because it does not keep well, a boy delivers it just before each meal. It is covered and placed on a board which he balances on his bicycle all the way from town to the hospital. In town, we often see little boys carrying the bread home on their heads. The *mast* is a cultured milk similar to yogurt and is safe to eat even in the villages.

My biggest problem is competent supervisory help. At present I have a twelfth grade student, but she will go to school this fall. We are now contacting every possible source to find someone whom I can train to write modified diets and take charge of tray service. This is easier said than done, however, as my assistant must read, write, and speak English. The problems here are essentially the same as in the states only more complicated. If you know of any Iranians taking home economics in the states, please try to persuade them to take dietetics and return to the Shiraz Medical Center as my counterpart.—*Viola Fisher, Shiraz Medical Center, The Nemazee Hospital, Shiraz, Iran.*



CURRENT LITERATURE

AMERICAN JOURNAL OF PUBLIC HEALTH

Vol. 46, October, 1956

* Endemic goiter in Costa Rican school children. C. Perez, A. Salazar-Baldioceda, O. B. Tandon, and N. S. Scrimshaw.—p. 1283.
* Antibiotics in food preservation. C. G. Durbin. —p. 1306.
* Foods for the upper age group and nutritional implications. E. L. Batchelder.—p. 1329.

Endemic Goiter in Costa Rica. The use of potassium iodate is recommended in many tropical areas for iodization because of its stability under extremes of moisture and temperature. Since potassium iodide can be used only to iodize a very dry refined salt distributed in a protected package, potassium iodate will prove more practical for the iodization of salt in Costa Rica. It is suggested that the salt in Costa Rica be iodized with 1 part of iodine in 10,000 parts of salt and 1 part in 20,000 as the minimum level.

Antibiotics in Food. Antibiotics may be used so that no residue remains in the uncooked food. This is acceptable provided the food is always cooked and that the cooking always destroys all of the antibiotic. In addition to meats, antibiotics have been suggested for use in milk, eggs, and fresh vegetables. Because antibiotics may inhibit starter cultures used in cheese manufacture, dairy products to be used for production of cheese should under no circumstances contain antibiotics.

Foods for the Upper Age Group. From the results cited, it appears that ascorbic acid intakes of older people may often be too low to promote satisfactory serum ascorbic acid levels and to maintain healthy gums. The metabolic data from the studies provide additional information as to critical levels of calcium and ascorbic acid intake. New facts cited as to sizes of servings taken by women of different ages and the frequency with which various kinds of food were reported in women's diets will find many uses. When such information is available, it willl be of great value to those in food processing and serving.

DIABETES

Vol. 5, September-October, 1956

* Effect of proteins on the blood glucose levels. G. Joachimoglu, and H. N. Antoniades.—p. 383.
* Effect of insulin on glycosuria, polyuria and food intake in alloxanized rats. F. M. Sturtevant. —p. 388.
* The development of diabetic retinopathy. Effects of duration and control of diabetes. R. C. Hardin, R. L. Jackson, T. L. Johnston, and H. G. Kelly.—p. 397.

Effect of Proteins on the Blood Glucose Levels. This investigation was done to learn about changes in level of blood glucose, after feeding normal and diabetic human subjects with various amounts of isolated plant proteins, gelatin, and egg white. Determination of the glucose in the blood of normal and diabetic human subjects 3½ to 5 hr. following the ingestion of different proteins suggests that egg albumin has the highest rate of conversion to glucose followed by oat protein, wheat protein, lentil protein, and pea bean protein. There was no significant effect on the blood sugar levels of the tested diabetic persons, although greater doses of plant proteins are necessary to obtain more conclusive results.

Effect of Insulin on Glycosuria, Polyuria, and Food Intake in Alloxanized Rats. In recent studies of the quantitative relationships among glycosuria, food intake, and body weight in alloxan-diabetic rats, an index of disturbance in glucose metabolism that was independent of variations in food intake and body weight was used. It was expressed as the ratio of glycosuria to food intake, which is readily converted to the percentage dietary carbohydrate that is utilized. Utilization thus calculated was found to be significantly increased by adrenalectomy and reduced by lethal doses of cortisone or thyroxin.

Effects of Duration and Control of Diabetes. This study was designed to separate, if possible, the influences of duration and degree of control on the development of diabetic retinopathy. The subjects were grouped in four different ways, but, no matter what division was made, there always existed a highly significant correlation between degree of control and the incidence and severity of retinopathy. When groups of patients whose duration of diabetes exceeded fifteen years were studied, no correlation between duration and retinopathy was found. It was concluded that except for the time required for its appearance, duration of diabetes is not an important factor in the development of retinopathy. The only identifiable factor bearing a constantly significant relationship to the incidence and severity of retinopathy is the degree of control of the diabetes. Differences in the pathologic physiology of well controlled and poorly controlled diabetic patients may provide information useful in the explanation of vascular degeneration.

FOOD AND NUTRITION NOTES AND REVIEWS (AUSTRALIA)

Vol. 13, May and June, 1956

* Measurements of skinfold thickness. E. H. Hipsley.—p. 41.

Measurements of Skinfold Thickness. Although a place for it in practical medicine has not yet been found, the measurement of skinfolds by the calipers is simple and rapid. This article discusses the method. It is thought that future work may show that skinfold measurements are more closely related to some biochemical and biophysical estimations than is body weight, and may thus help to make the observations more significant.

JOURNAL OF AGRICULTURE AND FOOD CHEMISTRY

Vol. 4, October, 1956

* Cereal components, free amino acids of fresh and aged parboiled rice. I. R. Hunter, R. E. Ferrel, and D. F. Houston.—p. 874.
* Vitamin assay. Vitamin B_6 in sterilized milk and other milk products. A. Z. Hodson.—p. 876.
* Food irradiation. Sulfides released from gamma-irradiated meat as estimated by condensation with N,N-dimethyl-p-phenylenediamine. E. P. Marbach and D. M. Doty.—p. 881.
* Irradiation effects on beef, chromatographic separation of porphyrin produced from myoglobin by gamma-irradiation. I. D. Ginger and B. S. Schweigert.—p. 885.

Free Amino Acids of Fresh and Aged Parboiled Rice. These investigations show which free amino acids commonly occur in parboiled rice of different natural origins and those treated by manufacturing processes, and indicate that losses result when rice is stored. Additional study is needed to obtain quantitative data for determining the relationship of these losses to browning phenomena and to changes in nutritional values.

Vitamin B_6 in Sterilized Milk and Other Milk Products. Two microbiologic assay methods for vitamin B_6 have been slightly modified to conform to the newer knowledge of the vitamin and the metabolic requirements of the assay organisms. The modified methods give similar but not necessarily identical results when applied to fresh or pasteurized milk or nonfat dry milk solids, but different results when applied to stored evaporated milk. Experimental work suggests that pyridoxal of fresh milk is changed progressively to pyridoxamine and then to an unknown form of vitamin B_6, during processing and storage of evaporated milk. The unknown form of the vitamin is not equally active for the assay organisms.

Sulphides Released from Gamma-Irradiated Meat. The reaction of hydrogen sulphide with N,N-dimethyl-p-phenylenediamine to form methylene blue has been adapted to determine small quantities of hydrogen sulphide from gamma-irradiated meat. The odorous vapors from irradiated meat are carried with a stream of nitrogen into a trapping tube containing cadmium hydroxide and sodium hydroxide. It is shown that free hydrogen sulphide probably is not present in gamma-irradiated meat, but that cadmium sulphide is formed in the trapping solution from some volatile sulphur-containing complex.

Chemical Changes in the Red Pigment of Meat. Methods were devised for studying the nature of the chemical changes that occur in the red pigment, myoglobin, when beef muscle

or muscle extracts are irradiated with gamma rays. With the conditions devised, significant quantities of a green pigment were produced from myoglobin during irradiation with a total dosage approximating 1.3×10^6 rep. It is suggested that the altered heme compound is an oxidation product of the heme moiety of myoglobin.

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Vol. 162, October 13, 1956.
* Age, sex, serum lipids and coronary atherosclerosis. D. Adlersberg, L. E. Schaefer, A. G. Steinberg, and C. I. Wang.—p. 619.
* Low-protein obesity diets. Correspondence.—p. 685.
* Phenylalanine in foods. Queries and Minor Notes. —p. 697.
Vol. 162, October 20, 1956
* Preparation of meats. Queries and Minor Notes. —p. 848.
Vol. 162, October 27, 1956
* Sodium-free diet. Queries and Minor Notes.—p. 939.
Vol. 162, November 3, 1956
Measurement of blood pressure in obese persons. K. W. Trout, C. A. Bertrand, and M. H. Williams. —p. 970.
* Changing dietary patterns. Foreign Letters. United Kingdom.—p. 1002.

Age, Sex, Serum Lipids, and Coronary Atherosclerosis. All available evidence, according to the author, indicates that coronary atherosclerosis is more common in men than in women in the younger age groups, that about 90 per cent of persons under the age of fifty years who suffer from coronary artery disease are men, and that the first coronary artery occlusion occurs at an earlier average age in men than in women. A substantial number of all cases of coronary artery disease and most coronary occlusions occurring in individuals under fifty are related not to age but to a complex pattern of metabolic, hereditary, environmental, and endocrinal factors, the precise proportions of which have not as yet been clearly defined.

Low-Protein Obesity Diets. In commenting on the low-protein obesity diets, the author points out that one factor which he feels perhaps deserves special emphasis is the influence of appetite, or lack of it. While anorexia is prevalent in malnutrition, the opposite is true in obesity, and therefore anything that decreases appetite is of obvious importance in treating obesity.

Phenylalanine in Foods. This is an essential amino acid and the complete elimination of it from the diet would be unwise. It has been demonstrated, however, that tyrosine, a nonessential amino acid, apparently has a phenylalanine-sparing effect, since up to 50 per cent of the phenylalanine requirement can be met by tyrosine. According to Rose, the minimum daily requirement for phenylalanine is 1.1 gm., and the recommended daily intake is 2.2 gm. A table is given showing the amount of phenylalanine in some common foods.

Preparation of Meats. There is no indication that, during the preparation of meats by frying, electric broiling, or charcoal broiling, carcinogenic substances are formed by the action of temperature or smoke on the components of the meat. A negligible amount of research has been undertaken on this subject. Some animal experiments have been performed, which are described.

Sodium-Free Diet. Some persons theorize that man should live as many animals do, and that the use of added salt is abnormal and even harmful. When necessary, the resorptive power of the kidneys can conserve sodium so that practically none is lost in the urine, and the elimination by skin and intestine is covered by the salts of natural foods. When there is an excessive loss, extra salt ingestion is necessary to save life. Otherwise, the great mass of patients live comfortably on the most rigid sodium restriction even in hot weather.

Changing Dietary Patterns. Results of a report are given on changing dietary patterns since 1954 in England, at which time rationing of meats, fats, and cheese was ended. Meat consumption rose 12 per cent; fats and oils, 7 per cent; sugar and sirup, 8 per cent. It is noted that the consumption of protein, fat, iron, vitamin A, riboflavin, and ascorbic acid is directly related to family income, but, except for iron in the low income groups, the intake of the other nutrients is above the recommended allowances of the British Medical Association's committee on nutrition.

THE JOURNAL OF BIOLOGICAL CHEMISTRY

Vol. 20, May, 1958
* Amino acid supplementation and voluntary alcohol consumption by rats. L. L. Rogers, R. B. Pelton, R. J. Williams.—p. 321.
Vol. 222, September, 1956
*Erythrocyte turnover in rats fed diets high in methionine. H. P. Cohen and C. P. Berg.—p. 85.

Amino Acids and Alcohol Consumption. In selecting the amino acids to be used, it seemed especially appropriate to determine the effect of glutamic acid because of its close structural similarity to glutamine. The effect of glutamine in decreasing voluntary alcohol consumption by rats has been compared with that of glutamic acid, sodium glutamate, asparagine, and glycine. Only glutamine produced a statistically significant decrease.

Effect of Diet on Red Cell Turnover. Six male rats of the Sprague-Dawley strain, 105 to 137 days old, were employed in this study. Glycine-2-C^{14} was injected into those fed high-methionine diets and those fed normal diets to produce radioactive hemoglobin and to allow comparisons of the relative rates of hemoglobin turnover. Hemin was isolated, its quantity calculated from its iron content, and its specific activity determined. Samples drawn at intervals showed more rapid incorporation of radioactivity, followed by more rapid decrease, in the hemin of the rat fed the high-methionine diet. The conclusion reached is that excess dietary methionine accelerates the red cell turnover.

THE JOURNAL OF THE CANADIAN DIETETIC ASSOCIATION

Vol. 18, September, 1956
Tables before you. E. P. Scarlett.—p. 12.
*Problems in the preservation of flesh foods. H. L. A. Tarr.—p. 30.

Preservation of Flesh Foods. Mention is made of experiments with oysters and cooked crab meat and the work in the Florida area to preserve shrimp with Aureomycin-ice or by transporting them in Aureomycin-containing chilled sea water. The results were generally satisfactory, the levels of Aureomycin required for preservation being about five to ten times that required for fish preservation. One of the most serious deteriorations in flesh foods, the author feels, is that of the development of oxidative rancidity. It is found in cold stored fish, frozen pork, poultry, and other meats. Tight wrapping is of considerable value, as is glazing the fish with a thin layer of ice. Oxidative rancidity develops much more slowly in flesh foods stored at −30°C. then in those stored at −20°C., or at higher temperatures. The value of wood smoke has long been recognized, and recent work has indicated that combinations of ascorbic acid with wood smoke made excellent antioxidant mixtures.

JOURNAL OF THE INDIAN MEDICAL ASSOCIATION

Vol. 27, August 16, 1956
* Effect of skimmed milk powder on school children. S. B. Lal and A. Bose.—p. 136.
Vol 27, September 1, 1956
* Nutritional oedema syndrome in children. K. J. Vyas.—p. 173.

Skim Milk Powder and Children. After supplemental feedings with nonfat dry milk for about a year, the increased height of children was 1.81 to 1.96 in. in the experimental group with an over-all average of 1.92 in. as against 1.52 in. in the control group. In the course of thirty days, an average increase in height of 0.61 to 0.69 in. in the experimental group was noted. The large increase in the trial was due to the longer duration of feeding, and it could be expected that even with 8 oz. skim milk supplement to the existing diet of the children, their height would increase by 0.4 in. in a year, and the weight by 0.63 lb. in a year.

Nutritional Edema Syndrome. The diet of the poor class children observed was mainly of cereals and butter milk with milk added only rarely and no fruits. The diet of the middle class children was cereals, dal, rice, vegetables and daily intake of milk but no fruits. History of breast feeding which was continued until one and one-half to two years of age was obtained in 90 per cent of the children. The nutritional edema syndrome was seen in more than 75 per cent in the poor classes. The features were edema, retarded growth, changes in skin and hair, mental apathy, anemia, hepatomegaly, and specific deficiencies of vitamin A and the B-complex.

THE JOURNAL OF NUTRITION

Vol. 60, September, 1956.

- Development of fatty livers during lactation of rats fed amino acid rations. L. E. Hallanger and M. O. Schultze.—p. 25.
- A study of the effect of chlortetracycline (Aureomycin) upon calcium retention by the growing male albino rat. E. W. Hartsook.—p. 97.
- Influence of food and energy restriction and subsequent recovery on body composition and food utilization of rats. J. H. Meyer, C. E. Lueker, and J. D. Smith.—p. 121.
- Effect of added lysine on growth of rats fed a cereal and milk diet. H. P. Sarett.—p. 129.

Vol. 60, October, 1953

- The effect of age on the protein and methionine requirements of the rat. E. W. Hartsook and H. H. Mitchell.—p. 173.
- The relationship of vitamin B_6 to serum protein and nonprotein nitrogen in the rat during pregnancy. M. L. Ross and R. L. Pike.—p. 211.
- Ascorbic acid utilization by women. Response of blood serum and white cells to increasing levels of intake in two groups of women of different age levels. E. H. Morse, M. Potgieter, and G. R. Walker.—p. 229.
- Nutritive value of protein and tumor-host relationship in the rat. J. B. Allison, R. W. Wannemacker, Jr., L. Prosky, and M. L. Crossley.—p. 297.

Fatty Livers During Lactation. The reason for development of fatty livers during lactation is not clear at present. It is thought that doubling the methionine content of the ration in this study did not prevent the condition. Rats fed protein-free amino acid rations developed hypertrophied and severely fatty livers under the stress of lactation. After lactation, the concentration of liver lipids decreased. When lactation of rats was supported by an adequate diet, some hypertrophy of the liver was observed but the lipid content of the liver decreased.

Aureomycin and Calcium Retention. One of the more prominent theories concerning the explanation of stimulation of animal growth given by antibiotics is that the antibiotic induces increased absorption of nutrients from the gastrointestinal tract. This study was done to test whether Aureomycin could, during a five-week growth period, increase the retention of carcass calcium in weanling rats given experimental diets containing two levels of calcium in the presence of 0.44 per cent of inorganic phosphorus and adequate vitamin D under the condition of equal food intakes within replicates of animals. The supplementation of the basal diet did not increase body weight, carcass water gain, body length, carcass calcium gain, or the percentage of calcium retention. It did increase the carcass ether extract gain to an extent that closely approached statistical significance at the 5 per cent level and significantly decreased carcass dry matter gain.

Food and Energy Restriction. Growing rats were restricted in their food or energy intake for three or four weeks at 70 per cent of the food intake per unit of body weight$^{0.75}$, of the *ad libitum*-fed controls. They were fed a total amount of food equivalent to that consumed by the controls. The rats in the first experiment in which the food and energy intake were restricted for four weeks came within 9 gm. of the weight gain of the controls. In the second experimental period, no differences between groups in weight gains were shown. The proportion of fat to fat-free tissue for the rats restricted in energy intake and subsequently refed was the same as that of the ad libitum-fed controls.

Lysine in Cereal and Milk Diets. On a diet consisting of only cereal and powdered milk, animals gained an average of 192 gm. in six weeks, whereas on the diets supplemented with L-lysine or vitamins or both, the average gains were 200 to 204 gm. A comparison of weight gain on some of the diets showed a nonsignificant p value of approximately 0.2. It is concluded that the growth in rats was not significantly improved by the addition of a lysine or vitamin supplement. Milk and cereal complement each other.

Age and Protein Requirements. These investigations were made to develop mathematical means of assessing protein and amino acid requirements precisely at different ages to determine whether the requirements of the sulphur-containing amino acids change significantly in relation to the other amino acids with changes in the age of the animal. Protein requirement was found to decrease in an exponential fashion as age increases. The methionine-plus-cystine requirement decreased in an exponential fashion as age increases, from 0.98 to 0.26 per cent. Unanimous indication is given that keratin synthesis assumes an increasingly important role in protein biosynthesis as maturity is approached and attained.

Serum Protein and Non-Protein Nitrogen in Pregnancy. In studies with the rat, depletion of maternal vitamin B_6 stores prior to mating, or pyridoxine deficiency during pregnancy or both, led to changes in serum protein and non-protein nitrogen concentrations in the rat which are similar to those reported for the toxemias of pregnancy. The data show a trend similar to that reported for human beings.

Ascorbic Acid Utilization by Women. Concern is with the relationship between the ascorbic acid level in blood serum and white cells with subjects receiving smaller graded levels of supplementation than previously used. Comparison is made with women of different age levels. Correlation between serum and white cell ascorbic acid levels was significant only in the young group on intakes of 32 and 47 mg. per day. There was no significant difference in uptake of ascorbic acid by the white cells in the young group as compared with that of the older group. Difference in regression of white cell level on serum level between the groups was not significant.

Diet and Tumor-Host Relationship. Three types of transplanted tumors were studied, with the suggestion arising that tumors may vary as do normal tissues in their interrelationships to body metabolic pools, some tissue proteins being depleted more than others, some not at all in the presence of inadequate amino acid intake. A possible correlation between protein, anabolic, catabolic influence of tumors and the effects of ethylenephosphoramides was also suggested. Like effects on tumor and body growth were found with the sarcoma and Walker carcinoma 256, in animals fed diets of wheat gluten, casein, or beef. Development of the Flexner-Jobling carcinoma was very poor in animals fed wheat gluten and maximum in rats fed egg albumin. This response was more like that of body tissues.

THE MILBANK MEMORIAL FUND QUARTERLY

Vol. 35, October, 1956

- Maternal and newborn nutrition studies at Philadelphia Lying-In Hospital. Newborn studies. IV. Clinical findings at birth and one month for babies of mothers receiving nutrient supplements. A. Randall, IV, J. P. Randall, R. V. Kasius, W. T. Tompkins, and D. Wiehl.—p. 321.

Newborn Studies. This study was made considering the infant's size at birth and his growth during the subsequent three months and by the comparison of the prevalence of the various conditions among the groups of infants classified according to the nutritional supplement taken by the mother. It gives in detail the results of the examinations at birth as well as those at one month of age and compares the results of the intake of nutritional supplements by the mothers.

PUBLIC HEALTH REPORTS

Vol. 71, October, 1956

- Present status of controlled fluoridation in the United States.—p. 963.

Controlled Fluoridation in the U. S. As of May 1956, only 6 per cent of the towns and villages of under 10,000 population had fluoridation, even though some 45 per cent of the cities of more than 500,000 population were using fluoridated water. In numerical terms, this means ten cities of over 500,000 persons do not have fluoridation and some 16,000 communities of under 10,000 population are not using fluoridated water.

THE ROYAL SOCIETY OF HEALTH JOURNAL

Vol. 76, October, 1956

- The medical aspects of Salmonella infections. W. P. Phillips.—p. 649.

Salmonella Infections. It is recognized that organisms of Salmonella do survive in drains and sewers which serve an area of infection, often for some weeks after the infecting source has been cleared. Swabs should be taken from the drains of food-processing establishments to determine any recent contaminations. To put this theory to use, several food manufacturers have agreed to have regular swab samples taken from their drains and sewers.

SCIENCE

Vol. 124, October 12, 1956

- Fat changes during weight loss. S. M. Garn and J. Brozek.—p. 682.

• Bony dimensions and the estimation of men's reference weight. J. Brozek.—p. 685.

Fat Changes During Weight Loss. Losses in subcutaneous fat were clearly related to the initial thicknesses. Those parts of the body with the thickest fat deposits sustained the greatest loss during caloric restriction. In like manner, those persons with greater amounts of fat to start with sustained greater losses in fat. Since fat is withdrawn in proportions to the initial amount of fat present, relative fat patterns before and after weight reduction tend to preserve their individual characteristics.

Bony Dimensions and Estimation of Reference Weight. Deviations from a reference weight, predicted on the basis of bony dimensions, indicate more accurately the under- or overdevelopment of soft tissues in a given person than stature alone. Measurements of the thickness of subcutaneous fat from skinfolds help us to interpret these deviations in terms of approximate body composition. Leanness-fatness is thus added to underweight-overweight as a second "dimension" in the description of human body.

TEXAS STATE JOURNAL OF MEDICINE

Vol. 52, October, 1956
• Diabetes and pregnancy. R. A. Reis, E. J. DeCosta, and A. B. Gerbie.—p. 739.
• Addison's disease developing in a diabetic patient. J. J. Sloan and J. W. Chriss.—p. 743.

Diabetes and Pregnancy. The article gives a discussion of the management of diabetes and pregnancy. Basic principles pointed out are that careful evaluation and classification of the diabetic woman before or early in pregnancy should be made. Second, meticulous and constant diabetic management throughout pregnancy, labor, and the puerperium should exist. There should be early termination of pregnancy and immediate, continuing, and careful pediatric care should be give the child.

Addison's Disease in a Diabetic Patient. The case history given deals with two metabolic diseases involving two separate enzymatic systems affected by two entirely different sets of hormones and combined in one organism. In diabetes, there is a lack of insulin, resulting in hyperglycemia and a disturbance in fat and protein metabolism. In the other, there is a lack of the hormones of the adrenal cortex. Treatment with insulin decreases blood sugar levels and increases glucose storage and utilization, while the 11-oxysteroids mobilize protein, increase gluconeogenesis and cause a rise in blood sugar. The patient was given cortisone, which precipitated an acute psychosis for a few days.

THE TOHOKU JOURNAL OF EXPERIMENTAL MEDICINE

Vol. 64, Supplement IV, March, 1956
• Incidence to rickets. J. Ishikawa.—p. 7.
• Some factors affecting the frequency of rickets. S. Ito.—p. 17.
• Summary—p. 407.
Vol. 63, April 25, 1956
• Studies on body water in man. I. Total body water in normal subjects and edematous patients. D. Musha.—p. 309.
• Studies on body water in man. II. Body water compartments in normal subjects and edematous patients. D. Musha.—p. 319.

Incidence to Rickets. There have been reports from all parts of Japan on the incidence of rickets. The disease is considered to be nationwide. The frequency in the Tohoku district is particularly high among the dystrophic children, and severe rickets is also especially prevalent among that group. Measures for prevention constitute a leading problem in child hygiene, but it is felt that the prevalence can be suppressed by continued activity in advisory and supervisory services regarding infant and child care.

Factors Affecting the Frequency of Rickets. It is reported that the mode of feeding is closely related with rickets and that rickets is more frequent in the artificially fed and less so in breast-fed children. The author notes that while only 7.6 per cent, 10.1 per cent, 11.1 per cent, and 1.26 per cent of the nutritionally superior, good, satisfactory, and unsatisfactory groups were found to be suffering from serious or moderately serious rickets, it was 20.8 per cent in the group of bad nutrition, showing a highly perceptible difference. In this study, the frequency tended to be high in babies born in autumn and winter and comparatively low in the spring and summer babies. It was highest in frequency in the children four months old.

Summary on Rickets in Japan. The Tohoku district in northern Japan is an area in which rickets prevail. The characteristic feature is "dystrophic rickets" causing high infant mortality rate. That dystrophic rachitic infants are susceptible to various diseases can be explained systematically by clinical observation, experiments with tuberculous bacilli, and with antibody production to newborn pneumonia virus. It is mostly complicated with thiamine and riboflavin deficiency, with abnormal electrolytes levels, and also with hepatic dysfunction. Contrary to many studies made in Japan, latent tetany was found to exist. Regarding mass treatment, combined application of vitamin D_2 and citric acid proved to be superior in curing rickets to single application of either.

Total Body Water in Normal Subjects. Total body water averaged 56.4 per cent in twelve normal males and 48.6 per cent in eleven normal females. It presented a remarkable individual variability; it was high in lean subjects and low in obese subjects. It is noted that a borderline can be drawn between normal subjects and edematous patients by expressing the total body water in the percentage of their standard body weight. About 60 per cent of the standard body weight is the upper limit of the total body water in normal subjects, while the total body water exceeded 60 per cent of the standard body weight in most of the edematous patients.

Body Water Compartments in Normal and Edematous Patients. The data presented indicate that about 20 per cent of the body weight or 35 per cent of the body water is in the extracellular space and about 35 per cent of the body weight or 65 per cent of the body water is in the intracellular space. Intracellular fluid slightly increased in cardiac edema and renal edema except nephrosis. The lower value of the percentage of the intracellular fluid to the total body water obtained in the report does not necessarily signify the decrease of the actual intracellular fluid, because it is supposed that the body water is increased to a greater extent in the extracellular fluid than in the intracellular fluid.

FOOD ENGINEERING

Vol. 28, October, 1956
• New twists in lactose uses. FE Staff.—p. 56.
• Detects blood spots, speedily, accurately. H. C. Hood.—p. 82.

Properties of Lactose. New properties of edible lactose are being discovered by food manufacturers which have long been taken for granted by the makers of infant formulas and pharmaceuticals. These rediscovered qualities are being used as means of improving foods. The improvement is achieved in a variety of ways: enhancing flavor in Roquefort cheese, Thousand Island dressing, barbecue sauce mixes, canned vegetables, and fruit flavored soft drinks. The texture and color of foods is improved as well as the flavor, such as highlighting color in berry preserves and potato chips, assuring uniform color for top appeal in bread, and preventing browning of catsup in the neck of the bottle. Texture changes include adding flakiness and tenderness to pastry dough for frozen pie crust and augmenting moisture retention in pastry dough. These and many other potentialities, such as better processing methods and development of new items, are the reasons for food manufacturers' new interest in and intense study of edible lactose.

Machine for Grading Egg Quality. A machine has finally been developed to do the tedious job of candling eggs, which has been done by hand since the time of the Egyptians. The machine, which detects blood spots or bloody albumen and automatically rejects such eggs, can handle more than 7200 eggs an hour. Basically, the unit consists of two parts, one on either side of a conveyor belt. As the eggs pass through the detector, a beam of light is flashed from one side through the egg to the photoelectric cells on the other side which makes the "decision." The principle upon which the machine operates is that avian blood absorbs certain bands of the visible spectrum. Hence it is possible to detect extremely small amounts of blood by projecting a light into the egg. When an egg contains blood a ramp rises in its path and diverts it from the other eggs.

HOSPITAL MANAGEMENT

Vol. 82, November, 1956
• Perpetuation of food misinformation. Guest Editorial. R. M. Yakel.—p. 26.

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* Night feeding can be easy, economical and savory! K. Willard.—p. 40.
* A kosher dietary department. R. Rutchik.—p. 42.
* Weight control for cost control. A. Sanders.—p. 44.
* Food transportation equipment. S. Singerman.—p. 109.
* Cafeteria cash control. J. T. Farley.—p. 116.

Food Misinformation. In a guest editorial, the Executive Director of A.D.A. discusses the problem of perpetuating food misinformation and the manner in which hospital personnel can refute faddish ideas. Examples of current fad diets for weight reduction are discussed, as well as the recent report in this JOURNAL on trends in food advertising.

Night Meals for Personnel. Complaints about meals served to night staff in hospitals are well known, yet many hospitals still try to solve the problem in one of four ways. (a) The hospital sends employees to a local restaurant and pays the check. (b) Sandwiches and coffee are provided, but no hot dishes. (c) Self-service in which employees may "help themselves" in the kitchen is allowed. (d) The kitchen is kept open to provide "short-order" service for such personnel. It is suggested that the use of individual, vacuum-sealed stainless steel containers can solve the problem, allowing hot food to be served at night breaks, while still using regular dietary department personnel. Night meals can be prepared at the same time that regular evening meals are served. When the vacuum containers are filled, they can then be stored inside a heated cabinet until needed for the night staff. The cabinet neutralizes possible heat loss, and night staff receives the same meal that was served in the evening to day personnel.

Kosher Dietary Department. The author, who is Director of Dietetics, Beth Israel Hospital, New York City, reviews the Jewish dietary laws and then discusses the problems involved in operating a kosher dietary department. Problems of menu planning, leftovers, purchasing, training of personnel, and planning for two sets of utensils are among the administrative hurdles presented in such a situation.

Cost Control Through Weight Control. Four ways in which weight control can provide cost control in the dietary department are listed: (a) portion control; (b) food preparation through cooking by weight; (c) weight-checking receipts; and (d) labor saving in cases where a scale can be used as controls to replace human labor. The key to effective portion control is a small-portion control scale. Proper proportioning of ingredients in recipes is also a matter of importance in cost control, and this, too, can be accomplished by the use of a scale. The value of check-weighing receipts is discussed.

Food Transportation Equipment. In planning for the transportation of food in the hospital, the two concerns are to deliver food which is palatable and to do so as economically as possible. Both can be accomplished, only if the layout of the institution is considered, the actual physical plan of the building, and whether centralized or decentralized service or a combination of both is used. The advantages and disadvantages of centralized service are listed, as well as prerequisites for its successful use. The pros and cons of various systems of transporting food from the kitchen to patient are considered. A comprehensive list of manufacturers of food conveyor equipment is also presented.

Cafeteria Cash Control. A system for almost complete control of cafeteria cash receipts is outlined. In addition, a case history of moving the cashier in a busy cafeteria from the exit door to the end of the cafeteria line is presented. With this move a coin changer was also purchased, which enabled the cashier to operate more speedily; thus the line was not held up. The cost of the machine was amortized within six months, and the previous constant small shortages, for which the cashier could not be held responsible, were eliminated.

HOSPITALS

Vol. 30, October 16, 1956
* Size is no excuse for poor food service. M. G. Carey.—p. 76.
Vol. 30, November 1, 1956
22 convention notes worth repeating.—p. 60.

Good Food Service in the Small Hospital. The author feels that the standards of dietary service should be equally as high in a small as in a large hospital. Although the small hospital may be unable to hire a full-time, qualified dietitian, it is possible, depending on the situation, to make use of a "shared" dietitian, a part-time dietitian, or a trained food service supervisor. With such a person in the administrative capacity, the food service can be operated efficiently and effectively. Other factors, however, are also important. Centralized tray service is recommended as one means of overcoming personnel shortages, and the importance of having tray delivery under the control of the dietary department is stressed. Another area which should be questioned is that of equipment, for poor equipment may be the cause of what might appear to be bad management. Perhaps most important of all in insuring good food service is cooperation between departments, so that problems are faced as a team.

INPLANT FOOD MANAGEMENT

Vol. 3, October, 1956
* Use time, motion study to take strain out of labor. D. Jaffe.—p. 37.

Time-Motion Study. The value of time-and-motion study as applied to the food service industry are exemplified in this article by experiences at the Aetna Life Insurance Company, the Illinois Institute of Technology, and Jack & Heintz, Inc. The elements of work simplification can be broken down into seven questions: (a) Can the job be eliminated? (b) Can jobs be combined? (c) Are there unnecessary delays? (d) Is there misdirected effort? (e) Are skills used properly? (f) Are employees doing too many unrelated tasks? (g) Is work spread unevenly? A four-step prescription for simplifying work is quoted as: (a) Step One—break down the job. (b) Step Two—question every detail. (c) Step Three—develop the new method. (d) Step Four—apply the new method. How these principles can be applied to the food service industry is considered in the book, *Personnel Management in Hotels and Restaurants* by Dr. Donald E. Lundberg.

INSTITUTIONS

Vol. 39, November, 1956
* Replan to make work easy—techniques for taking jobs apart. L. H. Kotschevar.—p. 36.
* Measure meat yield of turkey parts. Sr. C. L. Brosmer P. Clements, I. Prudent, and A. R. Winter.—p. 44.
* How to improve personnel relations. R. Wynn. —p. 58.
* What is a food service manager's job? V. M. Eimicke.—p. 146.
* Making refrigeration work for you. Part 1. C. K. Litman.—p. 152.
* Make menus exotic. Curry proves easy to adapt. A. M. Macfarlane.—p. 176.

Work Simplification. In this article, not only are the principles of work simplification explained in a well outlined, clear manner, but terms are defined to help in understanding the techniques of the procedure. In a work simplification program, five steps are taken: (a) select the job to be improved; (b) break down the job in detail; (c) question the job and each detail of the job; (d) develop the new method; and (e) apply the new method. In the third step—analyzing the job—the questions of what, why, when, who, where, and how must be answered. In doing this, special forms, symbols, and techniques have been developed by industrial engineers. These involve the "flow process chart," for which special symbols indicating classifications of work are used, and slow-motion pictures. Since motion picture study of work usually breaks jobs down into greater detail than is given on a flow process chart, another set of symbols (called therbligs) are used. These, as well as the symbols used on flow process charts, are given, and the form used in analyzing a film record is also illustrated. If a record indicating the use of both hands is desired, a simo-chart (simultaneous motion chart) is made. A sample of this is also shown. After the analysis has been completed and a new method developed, the last step is the application of the new method. Problems and techniques in its accomplishment are discussed.

Yield of Turkeys. The percentage edible part, after cooking, is reported for frozen turkey parts from both large and small birds. Breasts gave the highest yield (64.2 to 67.8 per cent), followed by legs and thighs (52.3 to 56.7 per cent). The amount of turkey needed for 1 lb. ready-to-serve meat varied from 1.5 lb. for large turkey breasts to 2.6 lb. for small turkey backs. Tables give complete data on this study.

Improving Personnel Relations. In this, the second of two articles, the author lists six additional guides for developing techniques for human relations (nine were given in the first article). The new guides or principles are: (a) Administrators must maintain their own

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membership with their faculty and their community, both professionally and socially. (b) Change must be engineered with patience. (c) Administrative techniques exist which are helpful in handling conflict situations and should be utilized. (d) Techniques have been developed to help in coordinating group purposes and energies. (e) It is important for the group to study its own human relations and group processes. (f) Deliberate study of himself by the administrator has value.

Food Service Manager. The qualifications of a food service manager are defined. He must have complete knowledge of all the skills used in the operation; he must be able to organize and plan; and he must be a leader. He must be willing to accept responsibility for customer relations as well as for internal operation. Each of these aspects of the job is broken down in some detail, with three or four pertinent points under each being discussed.

Refrigeration. With this article, an eight-part series on how refrigeration can work for the food service operator is begun. In this first part, the role of refrigeration on food preservation is the topic. Normal refrigeration, which ranges in temperature from 35° to 45°F., is the medium which makes possible the serving of "like-fresh" foods the year round. The availability of medium-temperature refrigeration also added to the space dimension of foods, because with it, it became possible for excellent products in one area to be made available by rapid refrigerated transport to areas thousands of miles distant. "Low" temperature refrigeration for storage of frozen foods at 0°F. is the relatively new area in the field of refrigeration. Freezing, with subsequent storage at about 0°F., is a massive extension of medium temperature practice. Freezing either makes possible long seasons for foods that do not respond to medium temperature storage or adds to the length of the season or to the handling convenience of foods that do respond to it.

Curry. Curry dishes are growing in popularity in this country and can be adapted to large-scale cookery. Curry is not a single spice, but a blend of many spices, herbs, roots, and seeds—from eight to twenty perhaps. There are many blends, ranging from mild to very hot, but whatever the blend, two ingredients are always standard: tumeric and cayenne. Other ingredients may be: allspice, black pepper, red pepper, ginger, cinnamon, cardamom seed, coriander seed, celery seed, mustard seed, caraway seed, nutmeg, saffron, garlic, poppy seed, and fenugreek (seeds and leaves). Quality of commercial curries in this country varies, and it is wise to select your supplier with care. Some chefs even grind their own. Curry may be used to flavor appetizers, soups, sandwich fillings, salad dressings, sauces, and so on. Curry accompaniments and menu construction for meals containing curry are discussed. The article ends by presenting eighteen curry recipes and a number of tips "From the Notebooks of the Experienced" which should prove stimulating to the imagination.

THE MODERN HOSPITAL

Vol. 87, November, 1956

* Citrus fruits add savor to food service. D. H. Zumsteg.—p. 118.

Citrus Fruits. The place of citrus fruits in the hospital dietary is well established; in their various forms, they are popular with patients and they are in season the year around. It is pointed out that both the fresh fruits and the newer processed products represent "built-in" portion control. Fresh fruits are boxed according to size, and the new chilled orange, grapefruit, and mixed fruit juices are packed according to volume. Pre-prepared sections are also now available, which permits exact cost control. Examples of packaging of other citrus fruit forms are also detailed. The ways in which these fruits may be incorporated into the menus are discussed and illustrated with recipes for "foamy white caps" (suitable for use on liquid diets), frozen citrus salad (also suitable for some therapeutic diets), and several other dishes. The nutritional value of citrus fruits, with their high ascorbic acid content, is also spotlighted.

PERSONNEL JOURNAL

Vol. 35, October, 1956

* Developing participation: some fundamental forces. E. E. Jennings.—p. 166.

Developing Participation. Participation is rapidly being recognized as an important means of training. In opposition to the lecture method, it requires group discussion. However, this must be well guided participation with the teacher creating in the students a need to participate. Individual contributions are larger when the problem is relevant; difference of opinion is another stimulus to participation. The attraction the training group offers the individual trainee in the form of friendship, status, and recognition will draw the group together, and in this way the members will influence one another. Participation is even freer when trainees are allowed to choose their own groups because interacting with those whom they like is more satisfying. The more participation, the more suggestions and ideas are introduced to the group. The training director is responsible for influencing and guiding the group and for keeping the activity group-centered.

WHAT'S NEW IN HOME ECONOMICS

Vol. 20, November, 1956

* Frozen foods in today's market place.—p. 40.

Vol. 20, December, 1956

* The breads to bake for holiday giving.—p. 18.
* Recipes for breads to bake for holiday giving.—p. 20.

Frozen Foods. A recapitulation of the value of frozen foods in the homemaker's methods of food preparation is given. They provide: convenience, high nutritive value, and palatability. Suggestions are given for ways to teach foods classes how to use and appreciate frozen foods.

Holiday Breads. The suitability of giving breads as holiday gifts is highlighted in this short article. It is followed by eight recipes for breads which are adapted to gift-giving.

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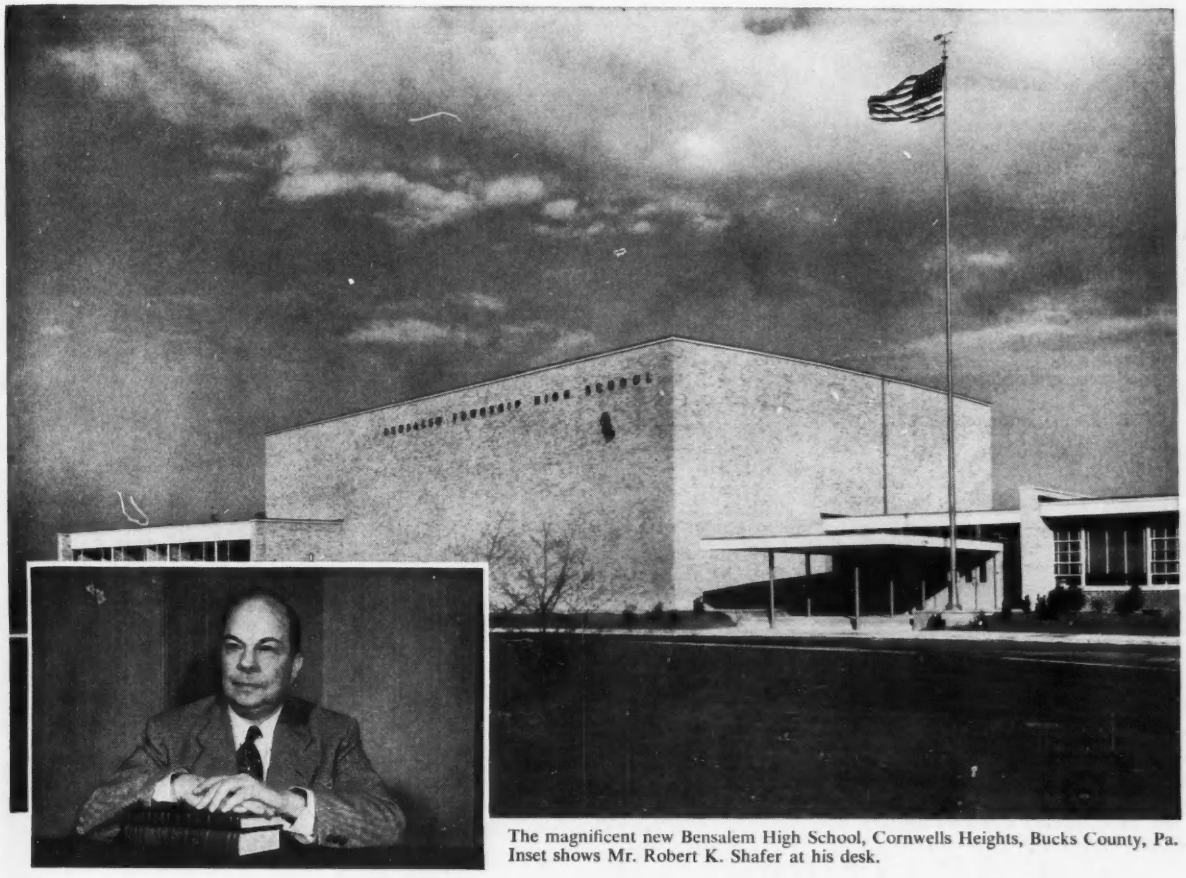
says Mr. Robert K. Shafer, Superintendent of Schools, Bensalem Township



The magnificent new Bensalem High School, Cornwells Heights, Bucks County, Pa. Inset shows Mr. Robert K. Shafer at his desk.

"Our new $2½ million Bensalem High School is completely modern and we have spared no reasonable expense to get the best equipment. That's why, when it came to furnishing our school cafeteria, we bought Boontonware. Its colors are cheery and relaxing, it handles quietly and is easy to keep spotlessly clean. But best of all, Boontonware lasts. Our cafeteria maintenance costs are low, thanks to Boontonware, and we can reflect this in the cost of our school meals."

Robert K. Shafer
Superintendent, Bensalem Township Schools

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1957 National Health Forum. Cincinnati will be the scene of the 1957 National Health Forum, sponsored by the National Health Council. The dates will be March 20 to 22. Theme of the meeting will be "Better Mental Health—Challenge to All Health Services." The chairman, Dr. Francis J. Braceland, has expanded on the purpose of the theme by explaining that "The Forum will seek to outline what we now know about how to foster mental health, and to encourage more effective use of that knowledge. Ten thousand additions each year to the total of 750,000 Americans in mental hospitals, and the unmet needs for help to troubled people outside the hospitals, constitute a challenge that cannot be ignored."

The Forum is one of an annual series conducted by the National Health Council in behalf of its fifty-one national organization members (of which A.D.A. is one), to consider some health problem of nation-wide concern requiring concerted thinking and action. The program will have five general sessions, during which speakers will present the general problems in mental health in the U. S. Group discussions will also be held to identify specific things that health agencies and other organizations, and individual citizens, can do to improve America's mental health.

Holding the 1957 Forum in Cincinnati is the first step in a plan to rotate the Forums through different regions of the U. S., thus making them directly useful to more people. Previous Forums have been held in New York City.

New Educational Program. A new graduate and post-graduate program of intensive research training in human development and family has been announced by the Merrill-Palmer School, Detroit. One-year programs designed to supplement graduate training in psychology, sociology, education, and home economics will offer students supervised research experience in an on-going project or in one initiated by the student. Direct research activities, comprising more than half of the student's time, will be combined with course work, including an advanced seminar on the role of theory and method in research in human development and family life. Further information may be obtained from the Registrar, Merrill-Palmer School, 71 East Ferry Avenue, Detroit 2.

Seminar on Therapeutic Dietetics. On December 7 and 8, a seminar on therapeutic dietetics was presented at the University of Texas Southwestern Medical School, Dallas, in association with the University of Texas Postgraduate School of Medicine. The course was taught by members of the full-time and clinical faculty of the University of Texas Southwestern Medical School. Dr. Ruth M. Leverton, Oklahoma A. and M. College, and Dr. Pauline Berry Mack, Texas State College for Women, were guest speakers. The program included:

"Diet in Heart Disease"—Dr. Carleton B. Chapman
"Diets for Patients with Renal Insufficiency"—Dr. Jerry A. Stirman
"Use of Substitutes for Salts and Seasonings for Low-Sodium Diets"—Jeanette Prague
"Good Nutrition for Children"—Dr. Pauline Berry Mack
"Colonic Function and Motility"—Dr. Herbert A. Bailey
"Diet in Cirrhosis and Hepatic Disease"—Dr. Leonard L. Madison
"Today's Trends in Normal and Therapeutic Nutrition"—Dr. Ruth M. Leverton
"Drugs in Relation to Appetite, Nausea, and Intestinal Motility"—Dr. Arthur Grollman
"Food 'Faddism' "—Dr. Ruth M. Leverton
"Nutrition in Regard to Dental Health"—Dr. Pauline Berry Mack
"Feeding Problems in Mental Disease"—Dr. Gabriel A. Najera
"Dietetic Problems of the Patient under Prolonged Steroid Therapy"
"Relation of Metabolism to Infection"

Conference on Food for Aging. "Eating for Health and Happiness in the Later Years" was the subject of the annual conference on aging held by the Connecticut Society of Gerontology and the Connecticut Nutrition Council in October. The meeting, which was held at the University of Connecticut, Storrs, considered recent research, emotional effects of food, methods of preparation, and weight control, as well as budgeting problems.

New U.S.D.A. Releases. Newest in the U.S.D.A.'s series of publications to help school lunch operators is *A Guide for Planning and Equipping School Lunchrooms* which carries the number PA 292. This sixty-page booklet provides information on location, space, construction features, and equipment for all lunchroom areas and is based on the service of lunches meeting the Type A standard. For each lunchroom area, equipment needs are listed for four meal loads, ranging from 100 to 750 lunches per day. The guides recommended have been checked against the quantities of food required to prepare Type A lunches, allowing a margin for needed variety in menu planning. Area and space recommendations have also been checked to insure that they permit efficient arrangement of the recommended essential equipment. Factors considered include the following areas: receiving, dry food storage, nonfood storage, kitchen, serving, dining, dishwashing, maintenance, office, and locker and washrooms. A number of diagrams and tables serve to implement the recommendations, and the center spread provides scale templates of kitchen equipment. Copies of this publication may be ordered from the Government Printing Office, Washington 25, D. C., for 35 cents each.

Leaflet No. 264 is a new U.S.D.A. folder on "Know Your Butter Grades," which provides pictures of the three U.S.D.A. grade markings and explains each one. Single copies may be obtained on request from the U. S. Department of Agriculture's Office of Information, Washington 25, D. C.

"The Price of Milk" is a second, new four-page U.S.D.A. folder, listed as Leaflet No. 409, the title of which is self-explanatory. Drawings point up that the farmer gets 10.2 cents of the price of a quart of milk, while marketing costs eat up 12.3 cents. Other graphs are presented on trends in milk prices, income and milk price, and so on. Copies may be purchased from the Government Printing Office for 5 cents each.

The Human Nutrition Research Branch of U.S.D.A. has released "Recipes Featuring Cheese," an offset, eight-page booklet which carries the number ARS 61-4. Twenty-one recipes for home preparation of main dishes, salads, breads, and sauces using cheese are offered. Single copies may be requested from the U.S.D.A. Office of Information, Washington 25, D. C.

"Cooking White Rice" is another in the same series of recipe leaflets prepared by the Human Nutrition Research Branch. It is numbered ARS 61-2 (revised) and dated September 1956. After giving general directions for cooking rice, recipes for main dishes, vegetable dishes, breads, and puddings are detailed. Most of the recipes yield six servings. Again, single copies may be obtained on request from the U.S.D.A. Office of Information, Washington 25, D. C.

Booklet on Dry Milk. The Michigan State University Agricultural Experiment Station has released a new Circular Bulletin 223, "Whole and Nonfat Dry Milk in Quantity Food Preparation" by Pearl J. Aldrich and Grace A. Miller. A feature of the bulletin is a collection of thirty-nine standardized recipes for bakeshop products which are included in a pocket on the inside of the front cover. On one side of the recipe cards, weights and measures for 100 portions are given; on the other, weights only for 500 portions. Both sides have blank columns for the calculation of the exact yield needed. Three additional information cards, containing proportions of dry milk to use when substituting for fluid milk and directions for adjusting recipe yield, are also included. The recipes include yeast and quick breads, a variety of cakes, cookies, puddings, cream pie fillings, and desserts. The formulas for the cream pie fillings and puddings were developed using nonfat dry milk; recipes for puddings, pies, and desserts using dry whole milk are also included.

Text of the bulletin covers discussions on "what can dry milk do for me?" "how to use dry milk to best advantage"; questions and answers, and six "don'ts" in using dry milk.

Copies of this bulletin are available

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3 steam cookers
1 Savory toaster
1 Wolfe griddle
2 Wolfe hot plates
1 Hobart dishwasher
2 dry food tables
2 steam kettles

For information on how you get faster, more efficient food service with modern Gas equipment, call your Gas Company's commercial specialist. He'll be glad to discuss the economy and outstanding results you get with Gas and modern Gas equipment. *American Gas Association.*

free to Michigan operators, and will be sold at a cost of $1 a copy to those living outside the state. Requests or orders should be addressed: Bulletin Room, Agricultural Hall, Michigan State University, East Lansing.

Tables on Amino Acids. From the Commonwealth Agricultural Bureaux in England comes a new booklet on *Tables of the Amino Acids in Foods and Feedingstuffs* compiled by D. Harvey. Figures are presented in terms of amino acid per 16 gm. nitrogen, and data are divided into "foods of animal origin" and "foods of vegetable origin." A bibliography of 182 references is also included. This publication is Technical Communication No. 19, Commonwealth Bureau of Animal Nutrition, Rowett Institute, Bucksburn, Aberdeenshire, Scotland. Copies may be ordered for 15 shillings each from Commonwealth Agricultural Bureau, Farnham Royal, Bucks, England.

FAO Publication. *Protein Malnutrition in Brazil* (FAO Nutritional Studies No. 14) has been released as the third in a series of studies on protein malnutrition made at the recommendation of the Joint FAP/WHO Expert Committee on Nutrition. The two earlier ones dealt with Africa and Central America. This newest report covers a survey made in May and June 1953 in five capital towns in five different states in Brazil. In particular, inquiries were made concerning: (a) nutritional edema; (b) dyspigmentation of skin or hair associated with nutritional deficiency; (c) liver disease; and (d) hypoalbuminemia. The table of contents of this report includes: "medical aspects of the problem"; "natural history of *distrofia pluricarencial* in Brazil"; "prevention"; "proposals for further investigations"; and a summary and conclusions. Copies of this report may be purchased in the U. S. from the International Documents Service, Columbia University Press, 2960 Broadway, New York 27, for 50 cents each.

Film on Aging. "Proud Years" is the title of a new film on old age, which shows in detail the practical steps that can be taken to help older people lead active, useful lives. It provides a means by which the aged and their families can explore together the day-to-day problems that accompany old age. The script was written and directed by George C. Stoney. It is a 16 mm. film with music and narration. Produced with the aid of a grant from Chas. Pfizer & Co., the film will be distributed by the Center for Mass Community, Columbia University Press, 1125 Amsterdam Avenue, New York 25.

Army Personnel Changes. The following personnel announcements concerning dietitians have been made by the Army Medical Specialist Corps.

APPOINTMENT, REGULAR ARMY

1st Lt. Helen E. Price

APPOINTMENTS AND ACTIVE DUTY

2nd Lt. Miriam E. Betzer
2nd Lt. Barbara J. Brown
2nd Lt. Ann L. Curtis
2nd Lt. Maureen A. Delaney
2nd Lt. Doris E. Duke
2nd Lt. Sara N. Duvall
2nd Lt. Loa S. Fisher
2nd Lt. Aida L. Guerrero-Rodriguez
2nd Lt. Alice L. Kelson
2nd Lt. Anne B. Lewis
2nd Lt. Beverly I. Lutz
2nd Lt. Doris J. McNabb
2nd Lt. Patricia A. Pramik
2nd Lt. Geraldine B. Redzinak
2nd Lt. Mary J. Renfro
2nd Lt. Barbara F. Rushing
2nd Lt. June E. Waters
2nd Lt. Florida A. Wilder
2nd Lt. Anna J. Wilson

PROMOTIONS

Captain to Major

Kathryn V. Buck
Edith M. Hobson
Gladys Hook
Elsie K. Miller
Elizabeth Nevels
Elna C. Petersen
Velma L. Richardson
Margaret Stuart
Dorothy L. Swartz

1st Lieutenant to Captain

Barbara A. Jones
Barbara G. Small

2nd Lieutenant to 1st Lieutenant

Betty A. Estrada

RESERVE OFFICERS RELIEVED FROM ACTIVE DUTY

Capt. Catharyn K. McAndrew
Capt. Mildred E. Moran

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Cinnamon Sugar
Corn Syrup
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Instant Ralston and Regular Ralston, *the square meal cereals from Checkerboard Square.*

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1st Lt. Carol J. Andrews
1st Lt. Monica A. Bonemeyer
1st Lt. Ellen M. Cox
1st Lt. Ruth E. Damon
1st Lt. Margaret F. Frisk
1st Lt. Joan D. Gibson
1st Lt. Joyce H. Gibson
1st Lt. Carlese M. Hamlin
1st Lt. Jean D. Jefferson
1st Lt. Barbara A. Lawson
1st Lt. Bonnie B. Lee
1st Lt. Virginia A. Maier
1st Lt. Sarah A. Martin
1st Lt. Lorraine Mondrick
1st Lt. Helen L. Morkovsky
1st Lt. Janet K. Parent
1st Lt. Virginia A. Paulsen
1st Lt. Margaret S. Ponessa
1st Lt. Donna J. Smith
1st Lt. Ann P. Tinsley
1st Lt. Elaine R. Upton
1st Lt. Dorothy P. Welch
1st Lt. Helen J. Wollard
2nd Lt. Ada W. Robinson

News of State Associations

Alabama Dietetic Association. At its October meeting in Birmingham, members of the Alabama Dietetic Association enjoyed hearing Frances Yielding, Alabama Employment Service, speak on "Looking at Ourselves in Business" and Edith Jones, Clinical Center, National Institutes of Health, Bethesda, Maryland, talk on "Looking at Ourselves in the Future." Miss Jones also made an interesting presentation on "A Total Research Hospital." Another featured speaker was Dr. Robert Stone, Spies Nutrition Clinic, Birmingham, who spoke on "A Discussion of Some Important Problems in Clinical Nutrition." A report of the 2nd International Congress of Dietetics was made by Dr. E. Neige Todhunter, Dean, School of Home Economics, University of Alabama.

Alabama dietitians are continuing their project of sponsoring a high school essay contest on "Why I Would Like to Be a Dietitian," or "What the Word 'Dietetics' Means to Me." The winner will be awarded a college scholarship.

Arizona Dietetic Association. The Arizona Dietetic Association and the Arizona Home Economics Association have named a joint committee to work on "Education through Libraries." Its first project has been to assemble a list of ten books and twenty-three pamphlets in the home economics field which would interest the homemaker. Librarians throughout the state have been contacted via an announcement letter, with the hope that they will add as many of the books on this list as funds permit.

Florida Dietetic Association. October 24 to 26 were the dates of the meeting of the Florida Dietetic Association in Jacksonville. The program included:

"Hospital Food Services"—H. Carl Rowland, Field Representative, Hospital and Orphan Section, The Duke Endowment, Charlotte, North Caroline

A panel discussion on hospital food services

"Dietary Significance of Cholesterol Metabolism"—Dr. Melvin Fried, University of Florida College of Medicine, Gainesville

"Florida's New Medical Center"—Michael J. Wood, Director, Hospital and Clinics, University of Florida, Gainesville

A panel discussion on new trends in management.

"Recent Research in the Treatment of Diabetes"—Dr. Joseph J. Lowenthal, President, Duval County Medical Society

"Hospital Service Program for Public Assistance Recipients"—Grace H. Stewart, Director, Division of Public Assistance, Florida Department of Welfare

"The Senior Citizen"—Marjorie Morrison, Chief Nutrition Consultant, Florida Board of Health

Indiana Dietetic Association. In Indianapolis, a new local dietetic association was organized this fall, to be known as the *Central District Dietetic Association*. The first meeting was held on September 20. Officers for the new group are: President, Kay Sheedy; President-Elect, Elizabeth Meubi; and Secretary-Treasurer, Elizabeth Phillips.

Louisiana Dietetic Association. The Louisiana Dietetic Association celebrated its tenth anniversary at its annual

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meeting in Shreveport, November 9 and 10. The program included:

"Foods: Fads, Fallacies, and Facts"—Dr. E. Neige Todhunter, Dean, School of Home Economics, University of Alabama, University

"Food Service During an Atomic Attack"—Gladys McCartney, Supervisor, Western Area, School Lunch Section, Louisiana Department of Education

"The Effect of Diet on Nutritional Status in Underdeveloped Areas"—Dr. William J. McGanity, Vanderbilt University School of Medicine, Nashville

Nebraska Dietetic Association. For its fall meeting in Omaha on November 2, members of the Nebraska Dietetic Association especially enjoyed the historical account of the activities of the state association by Vesta F. Davis, St. Catherine's Hospital, Omaha. Miss Davis, who was a charter member of the group of seven which met in Omaha in 1929, had gone through the old minutes of meetings, picking out highlights in the development of the Nebraska Association's program. Two copies of this history have been put in the A.D.A. Library and may be of interest as well as help to those members who may be working on similar historical recapitulations for their own areas.

New Hampshire Dietetic Association. November 1 was the date of the fall meeting of the New Hampshire Dietetic Association in Concord. Featured speaker on the program was Norman Brown, Administrator, Concord Hospital, who discussed hospital economics and public relations.

New officers in New Hampshire are: President, Anna King, Moore General Hospital, Grasmere; President-Elect, Mary Casey, Wentworth-Dover Hospital, Dover; Secretary, Caroline Shearman, Mary Hitchcock Hospital, Hanover; and Treasurer, Hattie Pearson, Epsom.

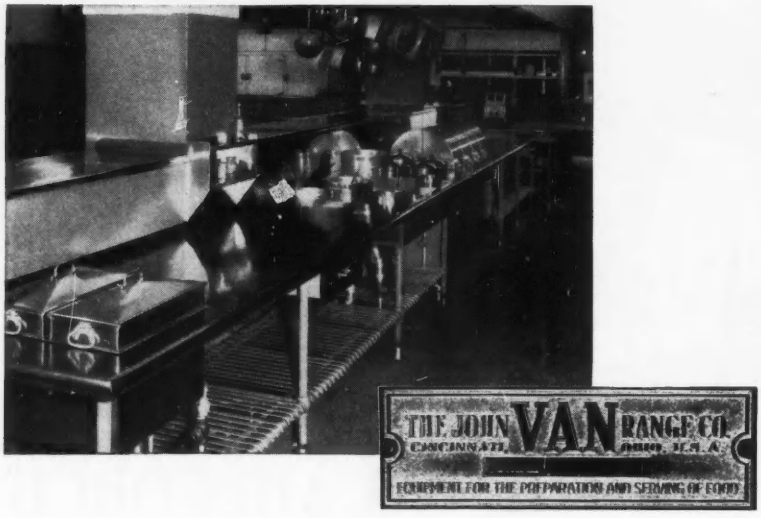
Oklahoma Dietetic Association. A two-day workshop for food service supervisors of small hospitals was held at the University of Oklahoma Hospitals, Oklahoma City, on November 1 and 2. Sponsoring organizations were the Oklahoma Hospital and Oklahoma Dietetic Associations. The program was geared to help the food service supervisor in planning ahead and in realizing that the cook spends a large portion of the administrator's budget. Topics covered included: how to work with personnel; menu planning; standardized recipes and controlled portions; food storage; correct cooking procedures; use of leftovers; food service; operation, maintenance, and care of equipment; sanitation, both in food production and service and dishwashing; and therapeutic diets and formula preparation.

South Carolina Dietetic Association. In South Carolina, dietitians held their twentieth annual meeting in cooperation with the South Carolina Home Economics Association on November 2 and 3 in Columbia. A feature of the program was a discussion on "Dietary Fats and Atherosclerosis" by Dr. Edwin Boyle, Jr., Department of Medicine, South Carolina Medical College, Charleston.

Washington State Dietetic Association. Programs of the *Seattle Dietetic Association* this fall have offered topics of varied interest. In September, a member of the League of Women Voters explained the processes of initiatives and referenda in general, and the pros and cons of some of the items to be decided in the November elections. Carolyn Byrow, a home economist in business, also spoke, explaining the current governmental emphasis on lamb. In October, Dr. Laura Crowell, University of Washington, discussed "Techniques of Effective Public Speaking," and in December, Dr. Edna Gunther, Anthropology Department, University of Washington, talked to the group on "Primitive Art."

Association Activities

New Staff Position in A.D.A. Office. The Executive Board of The American Dietetic Association is pleased to announce the appointment of Bessie Brooks West to a newly created staff position with the Association, that of Continuing Education Services Director. This appointment is the culmination of the planning of a special committee



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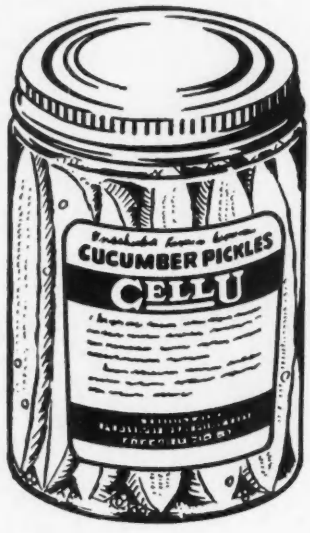
CUCUMBER PICKLES



A crisp accompaniment with sandwiches, salads or soup for the patient on a restricted diet. Sodium (as Na) 8.2 mgs. in 100 grams; 1.6 in 1 piece Calories, 16 in 100 grams; 3.5 in 1 piece (piece is approx 4 inches long, ½ inch wedge). Helpful in weight reduction menus.

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BOMBAY
California Valencia Orange and Grapefruit Bases

composed of: Margaret Gillam, Doris Johnson, Lucille Refshauge, E. Neige Todhunter, and Ercel S. Eppright, Chairman. Ruth Yakel and Wilma Robinson of the A.D.A. Headquarters office served as ex-officio members.

As outlined by the committee, the Continuing Education Services Director will have the following objectives:

(a) To develop additional services for members and to further implement the objectives of the Association, specifically by giving help by such means as workshops, group conferences, and institutes.

(b) To expand and coordinate the educational functions of the Headquarters office as they relate to the internships, the colleges and universities, and the individual members.

(c) To publicize and utilize the information obtained from section and committee studies and reports for the improvement of the services of the members.

(d) To stimulate and promote continuing education of all members and graduate study among qualified members.

(e) To develop the talents and resources of the members through helping them to expand educational skills.

(f) To serve as consultant in the preparation of educational material.

(g) To assist in a continuous evaluation of the educational program of the Association.

Mrs. West brings with her a background of sound professional work plus a wide area of understanding of the problems of dietitians and of the Association itself. She is a graduate of the University of California, holding both a bachelor's and a master's degree from that institution. From 1928 until last June, she was Head, Department of Institutional Management, Kansas State College, Manhattan. She is well known as the co-author of *Food Service in Institutions* and *Food for Fifty*. Her experience in Association affairs has been broad and diversified. She has served as President of the Kansas Dietetic Association; Chairman of the Education Section of A.D.A.; A.D.A. Secretary and Chairman of its Membership Committee; and as President of the Association in 1945-46. Dean Margaret M. Justin, School of Home Economics, Kansas State College, has characterized Mrs. West as "intelligent and able, with a resilience of spirit and a warmly human sympathy." We are sure that members will find working with Mrs. West stimulating and profitable.

In line with this expansion of educational service to members, the position of Educational Director, held by Wilma E. Robinson, has been renamed and will now be known as Dietetic Internship Liaison Director. Miss Robinson's duties in counseling with the approved dietetic internship directors will continue as before.

New Reprint List. An up-to-date list of reprints from this JOURNAL and other publications of the Association is just off the press. Copies may be obtained free on request to the Headquarters office.

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